No. 2.

19

—A—

SUMMARY OF PROGRESS

IN

MINERALOGY,

IN

1883.

BY

PROFESSOR H. CARVILL LEWIS.

From Monthly Notes in the "American Naturalist."

PHILADELPHIA:

January, 1884.

(*From the American Naturalist, January, 1883.*)

MINERALOGY.[1]

THE MECHANICAL SEPARATION OF MINERALS. — Mechanical methods for separating the minerals composing a rock are of great value in lithological investigations, and, where possible, should be employed in advance of chemical analyses. The best method is the now well-known one of using a liquid of great density, such as a solution of mercuric iodide, in which the pul-

[1] Edited by Professor H. CARVILL LEWIS, Academy of Natural Sciences, Philadelphia, to whom communications, papers for review, etc., should be sent.

verized rock is suspended, and its constituents separated successively according to their specific gravity.

Another method, recently employed with success, depends upon the attractability of ferruginous minerals by an electro-magnet. The poles of a horseshoe electro-magnet are moved about through the pulverized substances, the strength of the magnet being increased at each succeeding experiment by the addition of greater battery power. Thus magnetite and hematite may be first extracted by a weak current, then follow ferruginous augites, hornblendes and garnets, while a stronger magnet attracts tourmaline, idocrase, bronzite, actinolite, etc., and, finally, by a still more powerful magnet, biotite, chlorite, muscovite, and even dolomite may be extracted. Minerals containing very minute percentages of iron may be attracted if the magnet is powerful enough. The gray powder of syenites and diabases may thus be separated in a few minutes into a white powder containing the non-feldspathic minerals, and a dark-colored one composed of the other constituents.

By employing the former method in conjunction with this, very accurate results may be reached.

A *phonolite*, for example, consisting of orthoclase, nephelite, augite and magnetite, was first freed from magnetite by a weak magnet, then, the strength of the current being increased, a mixture of augite and nephelite was extracted, which was finally separated into its constituents by the specific gravity method, mercuric iodide of proper density being employed. The composition of the rock was thus found to be, magnetite 4 p. c., augite 11 p. c., nephelite 48.5 p. c., orthoclase 25.5 p. c., impure feldspar, etc., 11 p. c.

Axinite from Bethlehem.—Through the medium of the late Professor W. T. Roepper, Pennsylvania mineralogists have been familiar for several years with the specimens of axinite from near Bethlehem, Pa., the locality having been discovered by Professor F. Prime, Jr. The crystals are small, and of a pale brown color, often nearly colorless, and have the axe-like shape which has suggested the name of the species. They occur with asbestos in a hornblendic rock, and, while devoid of the beauty possessed by specimens of the same mineral from other localities, are of some crystallographic interest, as lately shown by B. W. Frazier, of Bethlehem. A close relationship has been found to exist between the crystallographic characters of axinite and those of datolite. The axial lengths closely correspond, and a comparison of the angles between similar planes shows a remarkable agreement. They are found, moreover, to correspond in habit as well as in angles. Both minerals are silicates of lime and contain boracic acid, and it is very probable that the morphological resemblance is consequent upon a resemblance in chemical composition.

SAMARSKITE FROM CANADA.—Mr. G. C. Hoffman has found irregular fragments of samarskite in Berthier county, Canada. The mineral is massive, has a sub-metallic lustre, brownish-black color, grayish-brown streak, hardness of about 6, fusing between 4 and 4.5, and specific gravity of 4.947. Its composition, according to an analysis given in the Amer. Jour. Science, Dec., 1882, is as follows:

Cb_2O_5,Ta_2O_5	SnO_2	YO	CeO	UO_3	MnO	FeO
55.41	.10	14.34	4.78	10.75	.51	4.83

CaO	MgO	K_2O	Na_2O	F	H_2O
5.38	.11	.39	.23	(trace)	2.21.

THE CRYOLITE GROUP OF MINERALS.—J. Brandl has investigated the chemical composition of the minerals of the Cryolite group, and derives several new formulæ. Pachnolite is shown to have the composition, AlF_3, CaF_2, NaF. Thomsenolite, often confounded with pachnolite, differs from it in composition by containing one molecule of water. New formulæ are also assigned to Ralstonite and Chiolite. Prosopite, Scheerer's analysis of which shows the presence of silicon, is now shown to contain no silicon, and the following formula is assigned to it: $Ca(MgNa)Al_2(F,OH)_8$. The rare mineral, Fluellite, has probably the formula, $AlF_3 + H_2O$.

HEATING APPARATUS FOR THE MICROSCOPE.—Thoulet describes in the *Bulletin de la Société Mineralogie de France*, a new method of heating objects upon the stage of the microscope. He has constructed a small "stove," or chamber, to rest upon the stage, and to contain the object and the thermometer. It consists of a glass tube fitting into a copper cylinder which rests upon a disk of copper, furnished with lateral prolongations, which can be heated by a gas jet. The whole is insulated by resting upon a disk of cork. The temperature of the chamber can be raised by heating the prolongations of copper and lowered by introducing a current of fresh air through a small tube fixed in the side. Very exact measurements can be taken with this simple apparatus, so well adapted for determining the temperature of the disappearance of bubbles in liquid inclusions, for studying the formation of crystals at various temperatures, or for other micro-chemical investigations.

MINERALOGICAL NOTES.—Descloiseaux has described some minute crystals which occur in Pegmatite near Nantes, France, and which probably are new. They are transparent, rectangular tables, less than a millimeter in length, which become white but do not fuse when heated, and are insoluble in acids. They are probably composed of a silicate of alumina, iron and lime, and are identical with some similar crystals previously described by Bertrand from another locality in the same region.——Mallard has just published a paper upon the action of heat upon crystallized

substances, in which his former conclusions regarding *pseudo-symmetry* appear to be confirmed.——Hintze reports the discovery of *Danburite* in Switzerland, on the Scopi. The crystals were at first thought to be topaz, which they closely resemble. The angles measured corresponded closely with those of the American mineral.——A nugget of gold, weighing forty-four pounds, has been found in the Ural district. This is the largest nugget ever found in Russia.——It is reported that natural sulphuric acid has been found in large quantity in Sweetwater county, Wyoming. The ground for a space of one hundred acres or more is impregnated with the acid, which is said to be of pure quality.

Digitized by the Internet Archive
In 2017 with funding from
This project is made possible by a grant from the Institute of Museum and Library Services as administered by the Pennsylvania Department of Education through the Office of Commonwealth Libraries

https://archive.org/details/summaryofprogres00lswi_2

(*From the American Naturalist, March, 1883.*)

MINERALOGY.[1]

ANALYSES OF SOME VIRGINIA MINERALS.—Professor J. W. Mallet has communicated to the *Chemical News* some notes of work done by students at the University of Virginia upon American minerals.

W. T. Page has analyzed an allanite of unusual chemical composition from Bedford county, Va. It occurred as a compact black mass, with pitch-like luster, spec. grav. 4.32, and the unusual hardness of nearly 7. Its composition is as follows:

SiO_2	Al_2O_3	Ce_2O_3	Di_2O_3	La_2O_3	Fe_2O_3	FeO	MnO
26.70	6.34	33.76	16.34	1.03	3.21	4.76	trace

BeO	MgO	CaO	Na_2O	K_2O	H_2O
0.52	0.54	2.80	0.49	0.55	1.99

The very large proportion of the cerium metals present (over 50 per cent., or double the usual amount), and the large excess of didymium over lanthanum are peculiarities which may justify its being considered as a new variety of allanite.

B. E. Sloan has reëxamined the helvite of Amelia C. H., Va., already refered to in the NATURALIST. Having at his command a larger amount of pure material than Mr. Haines possessed, a new analysis was made which conforms more closely to the formula adopted by Rammelsberg. The analysis gave:

SiO_2	BeO	MnO	FeO	Al_2O_3	Mn	S	
31.42	10.97	40.56	2.99	0.36	8.59	4.9	= 99.88.

W. H. Seaman analyzed a pale hyacinth-red garnet from the same locality, which, like the other recorded analyses of the same variety of garnet—spessartite, or aluminum-manganese garnet, shows an anomalous deficiency of triad as compared with dyad metals.

R. N. Musgrave has analyzed the albite from the same locality, the analysis closely corresponding to the tri-silicate formula $Na\ Al\ Si_3\ O_8$. The albite here occurs as a delicately aggregated mass of colorless flattened crystals, forming beautiful specimens.

A supposed metallic meteorite from Augusta county—a pear-

[1] Edited by Professor H. CARVILL LEWIS, Academy of Natural Sciences, Philadelphia, to whom communications, papers for review, etc., should be sent.

shaped mass of iron covered with an oxidized crust—was examined by the same analyst found to be of terrestrial and artificial origin.

On the other hand, some rough, flattened scales of iron, with jagged edges and often twisted as though made by a lathe, which were found in the sand accompanying native gold in the bed of Brush creek, Montgomery county, and which W. T. Page has analyzed, are regarded as specimens of native iron. The largest grains weighed as much as 60–80 milligrammes, while the smallest were almost dust. Analysis showed traces of copper, sulphur and quartz. The scales were but slightly oxidized. The method of occurrence rendered it improbable that these scales could have been detached from the picks and shovels used at the washings.

Analyses of some North Carolina Minerals.—In the same laboratory several North Carolina minerals have been examined.

W. T. Page examined the auriferous sand from Burke county, N. C., and found in addition to zircon, monazite, magnetite, etc., a number of malleable metallic grains, which, like those of the Virginia sand, referred to above, were often irregular, twisted and jagged. They were almost pure iron, mere traces of cobalt and quartz being present. The extended distribution of native terrestrial iron, thus shown, is of great interest.

Mr. Seaman has analyzed fergusonite from Brindletown, Burke county. It occurs in small reddish-brown crystals of tetragonal habit, and was first noticed by Mr. W. E. Hidden. Some four per cent. of tantalic acid was shown to accompany the columbium, the presence of didymium and lanthanum also being proved. Metals of the yttrium group, but of higher atomic weight (erbium, ytterbium, etc.) occur in small proportion with the yttrium. Counting the water as basic the ortho-columbate formula is deduced: $M'''\ Nb\ O_4$.

Mr. Seaman has also analyzed a columbate from the Wiseman mica mine of Mitchell county, which had formerly been regarded as euxenite, but which is shown to agree neither in physical characters nor in chemical composition with that species. The substance is compact, reddish-brown in color, with luster between resinous and adamantine, and with pale yellowish-brown streak. Hardness = 5.5. Spec. grav. = 4.33. The analysis gave

Cb_2O_5	WO_3 SnO_2	UO_2	Y_2O_3	Ce_2O_3	Di_2O_3 La_2O_3	FeO
47.09	0.40	15.15	13.46	1.40	4.00	7.09

CaO	H_2O
1.53	9.55 = 99.67.

Unlike euxenite, no titanium is present, and the deduced formula is that of an ortho-columbate, $M''_3\ Cb_2\ O_8$, while euxenite is a meta-columbate. The percentage of water, the low specific gravity and the appearance of the mineral, with its external crust of

yellowish material which sometimes penetrates the interior, indicate that it is a product of the alteration of samarskite or some allied species.

At the same locality a mineral allied to allanite occurs as flattened crystals of pitch-black color, brownish-gray streak and with an imperfect conchoidal fracture. H. = 6. Sp. gr. = 3.15. Analysis gave:

SiO_2	Al_2O_3	Y_2O_3	Ce_2O_3	Fe_2O_3	FeO	MgO	CaO	H_2O	
39.03	14.33	8.20	1.53	7.10	5.22	4.29	17.47	2.78	= 99.95

In the very small percentage of cerium it contrasts strikingly with the mineral from Bedford county, Va., of which the analysis is given above. The different proportions of the other constituents also point to the mineral as a distinct variety of allanite.

A NEW VARIETY OF BOURNONITE.—A specimen resembling "Fahlerz," found at the Great Eastern mine, Park county, Colorado, has been analyzed by W. T. Page. The mineral was steel-gray in color, with metallic luster and dark-red streak, with a crystalline structure and brittle, uneven fracture, having a hardness of about 4, and specific gravity of 4.89. It fuses and gives antimonal fumes before the blowpipe. Analysis gave:

S	Sb	Cu	Zn	Fe	Pb	siliceous residue	
26.88	34.47	23.20	7.14	1.38	1.19	5.86	= 100.12

The copper exists one-half as cuprous and one-half as cupric sulphide. It is as distinct a species as stylotypite, but in order to avoid multiplication of names it is suggested that both stylotypite and the species here described be considered as varieties of bournonite.

NATIVE GOLD ALLOYS.—Mr. W. H. Seaman has examined a number of grains, which, picked out by the aid of a lens from the platinum grains of Colombia, S. A., are shown to consist of gold alloyed in different proportions with silver, copper or mercury. A gold-copper alloy contained nearly sixteen per cent. of copper, while an alloy of gold, silver and mercury contained eighty-four per cent. of gold and seven per cent. of each of the two latter metals.

Another alloy obtained from Taguaril, Brazil, contained eight per cent. of palladium, and corresponded with the formula, $Pd\ Au_6$. The palladium gave it a bronze-like color.

SOME GREENLAND MINERALS.—In a paper on some minerals from the sodalite-syenite of South Greenland, Mr. Joh. Lorenzen gives a number of analyses of interest. Among the substances analyzed were microcline, arfvedsonite, ægirite, nephelite, eudialite, lievrite and lepidolite. It is interesting to observe that most of these substances occur similarly associated in Southern Norway. The rock, composed principally of microcline, arfvedsonite and sodalite has frequently a reddish-brown color, due to an ad-

mixture of garnet-colored eudialite. The lepidolite was shown to have a composition differing from that usually ascribed to that species in having a larger percentage of silica, less than half the quantity of alumina, and unusually large quantities of alkalies and of water, while no fluorine was present. It is fusible in a candle-flame. This may be a new species of the mica group.

Another mineral of interest occurs in curved, irregular crystals in the same rock. It has a hardness of 4, specific gravity 3.38, and has a brown color and white streak. It fuses readily before the blowpipe to a gray, dull bead.

The following composition was obtained:

SiO_2	TaO_2	Fe_2O_3	Al_2O_3	ThO	MnO	CeO	LaO DiO
27.95	0.97	9 71	2.41	7.09	4.20	10.66	17.04

CaO	Na_2O	H_2O	
3.09	7.98	7.28	= 98.38

The substance appearing to be a new species, the author has named it *Steenstrupine*, after Mr. Steenstrup, the discoverer of the mineral.

Tin in Alabama.—It is reported that valuable loads of tin-bearing rocks have been discovered at the Broad Arrow mines, near Ashland, Clay county, Alabama. The tin occurs as cassiterite finely disseminated in gneiss. The ore is being crushed and reduced to the metallic state on the spot, works having been erected for the purpose. A bar of tin thus made has already been received in New York.

Telluriferous Copper.—Professor T. Egleston, of N. Y., has reported to the American Institute of Mining Engineers an interesting case of the presence of tellurium in copper and of its effect upon the latter metal.

Some copper ore from Colorado had been sent to him to examine for arsenic and antimony. Finding neither metal present, a large quantity of the ore was purchased by a metallurgical firm, who, however, reported that they were unable to refine it, the furnaces having been "poisoned" by arsenic or antimony. Upon a re-examination of a larger quantity of material a trace of tellurium was discovered, the quantity being less than one-tenth of a per cent.

Although present in such minute quantity, the tellurium rendered the copper "red-shot." When the refined copper was passed through the rollers cracks showed themselves, which became larger the more the copper was rolled, until finally the cake of copper fell to pieces. When heated repeatedly the copper became covered with a white powder consisting of oxide of tellurium. No amount of heating could remove the tellurium or improve the quality of the copper. The influence of such a minute quantity of tellurium upon the copper is surprising.

bones be next year? Not fossilized certainly. Fossil bones may be split by frost, but if the frost attacks them before they are fossilized, their chances of being preserved are small indeed!

Quaternary.—The remains of *Colymbus septentrionatis* Linn, have been discovered by E. T. Newton, in the Mundesley River bed, Norfolk, England.——The arguments respecting the Loess are still continued. Dr. A. Nehring, of Berlin, answers H. H. Howorth, in the February number of the *Geologicol Magazine.* He gives a list of the steppe animals found in the European Loess (Lagomys, Dipus, Spermophilus, Arctomys, Cricetus, Hystrix, Arvicola, Equus, Antilope), and asserts his belief that a considerable part of Germany or Central Europe once had a steppe fauna and flora. This fauna was interposed between the Arctic fauna of the glacial period, and the forest fauna of the Neolithic epoch. Postulating a fauna and flora like that of East Russia and West Siberia, Dr. Nehring maintains that the wind may have played an important part in the formation of the loess-like deposits of many places in Central Europe.——H. H. Howorth concludes his "Traces of a great Post-glacial flood" in the March number of the same magazine. The marine drift, in which littoral and deep-sea shells are often found confusedly heaped together, in some cases with little mixture of sand or shingle, and confined to small areas, unaccompanied by those sheets of silt which must have remained had subsidence been the cause of its formation, yields, in Mr. Howorth's belief, conclusive evidence of a great wave of waters, carrying the shells to varying heights and distances according to the conformation of the coast.

MINERALOGY.[1]

The Nomenclature of Meteorites.—As a result of a careful study and classification of the 306 meteorites in the collection of the Museum of Natural History at Paris, Professors Daubrée and Meunier have introduced a large number of new names, which, however useful for classification, cannot be said to be a welcome addition to the already large nomenclature of lithology. The generic names, based on the amount of iron in the meteorites, appear to be well chosen, but the specific names are taken from the locality where the specimen chosen as a type happened to fall, and being without scientific import, will not receive general acceptance. By the valuable work of the authors, our knowledge of the origin and characters of meteorites has been greatly extended, but it can hardly be expected that lithologists will adopt all the names in the following classified list:

METEORITE.

I. Holosiderite.

Octibbehite, tazewellite, nelsonite, catarinite, braunite, caillite, schwetzite, jewellite, campbellite, burlingtonite, tuczonite, lenartite.

[1] Edited by Professor H. Carvill Lewis, Academy of Natural Sciences, Philadelphia, to whom communications, papers for review, etc., should be sent.

II. Syssiderite.

Pallasite, atacamaite, brahinite, deesite, lodranite.

III. Sporasiderite.

1. *Polysiderite.*—Toulite, logronite.
2. *Oligosiderite.* — Aumalite, chantonnite, aiglite, montrejite, parnallite, luceite, canellite, mesminite, belajite, butsurite, manbhoomite, banjite, limerickite, menite, bustite, richmondite, tieschite, erxlebenite, quincite, stawropolite, tadjerite, rutlamite, renazzite.
3. *Cryptosiderite.*—Howardite, omansite, chladnite.

IV. Asiderite.

Igastite, rodite, eukrite, shalkite, chassignite, bokkevelite, orgueillite.

The classification adopted by Tschermak is much more simple, being as follows:

I. Meteoric Stones.

1. *Eukrite.*—Anorthite and augite, iron being rare.
2. Olivine, bronzite, enstatite; iron rarely seen.
3. *Chondrite.*—Olivine and bronzite with iron.

II. Meteoric Iron.

4. *Mesosiderite.*—Silicates and meteoric iron forming a granular mixture.
5. *Pallasite.*—Meteoric iron porphyritically enclosing crystals of silicates.
6. Meteoric iron.

Gelatinous Silica.—Dr. H. Leffmann has found that at the bottom of bottles containing certain siliceous geyser waters from the Yellowstone National park, there is deposited a quantity of gelatinous matter looking like the white of egg, which, on analysis, proved to be nearly pure silica. It was entirely structureless, and by heat dried to a white opaque mass. After having been inclosed for several weeks in a closed vessel with strong sulphuric acid, it shrank to about one-tenth its volume.

The water from the "Opal spring" is opalescent, appearing like what is produced by adding an alcoholic solution of rosin to a large volume of water. The opalescence remains for months, gelatinous silica not being deposited unless the water is evaporated.

Zeolites from Fritz island.—B. Sadtler, Jr., has analyzed the chabazite, mesolite and apophyllite from Fritz island, near Reading, Pa. The analyses are published in the *American Chemical Journal*, and they agree closely with analyses of the same minerals from other localities.

Native Lead from Idaho.—Professor W. P. Blake has found native lead and minium near Bellevue, Idaho, where they occur in galena. The native lead, a rare species, "is in small rounded masses or grains from an eighth to one-quarter of an inch in diameter, and sometimes in irregularly reniform bunches, weighing an ounce or more. The red oxide is in the form of coatings or crusts on the metal."—*Amer. Jour. Science.*

Topaz from Maine.—Mr. G. F. Kunz has discovered topaz in fine and large crystals at Stoneham, Maine. Some of the large opaque masses were parts of crystals measuring a foot across. Of transparent crystals one of a bluish and greenish tint measured 2½ inches vertically and three inches across. A number of interesting minerals are associated with the topaz.

Turquoise from Arizona.—Professor W. P. Blake, in an interesting article in the *American Journal of Science* for March, describes some ancient mines of green turquoise in Cochise county, Arizona. The turquoise, which he has called "*chalchuite*," from the aboriginal name of the gem, is of a light apple-green color like that from New Mexico, and has a specific gravity of 2.7–2.8. It occurs in rock in seams and veinlets rarely more than an eighth or a quarter of an inch in thickness.

The locality is interesting from an archæological point of view. The mine had been worked probably by the Aztecs and Montezumas, and many ancient stone implements were found about the mine. Turquoise was in general use among the various tribes of Mexico, and was worked with considerable skill by ancient lapidaries.

Professor Blake thinks that turquoise should receive the mineralogical name of either "*callainite*," a modification of Pliny's name "callaina," or "*chalchuite*," derived from "chalchihuitl," a name probably older than Pliny's.

Molybdenite in Hong Kong.—F. Warrington Eastlake, in a communication to *Nature*, notes the occurrence of molybdenite or molybdenum glance (MoS_2) on the island of Hong Kong. Silver has been observed in small quantities, also galena, lead and iron pyrites.

The composition of the molybdenite is, sulphur 40 per cent, molybdenum 60 per cent, or one per cent less of sulphur than is given by Dana as the composition of American molybdenite.

Water in Chalcedony.—A geode of chalcedony recently received from Salto river Uruguay, contains an unusual amount of water, between two and three drams being observed. These geodes occur in a basaltic formation of amygdaloid and melaphyr.

Some enclosures in Muscovite.—Professor Lewis, in a paper read before the Philadelphia Academy, on Dec. 26, 1882, discusses the enclosures of biotite and magnetite so frequent in the muscovite of Southern Pennsylvania and Northern Delaware. By dissecting a crystal of muscovite enclosing biotite into a consecutive series of cleavage laminæ, a vertical section of the crystal is obtained, which, as exhibited in an accompanying plate, shows that while the edges of both the outer and inner crystals remain parallel in successive plates, the substance of the black biotite is gradually eaten away, and is replaced by the encroaching musco-

vite as the summit of the biotite crystal is approached. The inner black crystal contains a small hole filled by white muscovite, and this hole enlarges with successive plates until finally the biotite has completely disappeared, as though eaten away by the muscovite.

The author confirms the observations of Reusch and Rose on the parallelism of the crystallographic planes of the micas, as proved by their "strike-figures." The biotite is often altered into an exfoliating *hydro-biotite*, just as muscovite changes into margarodite (*hydro-muscovite*).

The superficial markings of reticulated magnetite are also discussed, and shown to be always parallel in direction with the lines of the artificial "strike-figures." Their direction is, therefore, not due to any twinning crystallization of the dendrites themselves, but to the governing influence of the crystallographic lines of the muscovite.

DOPPLERITE.—W. Demel has analyzed a homogeneous specimen of dopplerite from Aussee, and after drying at 100°–120°, finds 56.42–56.51 per cent. of carbon, and 5.34–5.20 hydrogen, leading to the formula, $C_{12}H_{14}O_6$. The ash contained a large percentage of calcium, the greater parts of which had probably been combined with the organic matter. Experiments were made to show that dopplerite could combine with calcium, and the conclusion is reached that this mineral may be regarded as the calcium salt of one or several acids belonging to the humus group.

"MOTHER OF PETRE."—The very interesting discovery, announced a few years since, that saltpetre (nitre) is formed in nature by the action of a living ferment, just as alcohol is formed by the growth of the yeast fungus, introduces new conceptions of the origin of the nitrates, and shows that the process of nitrification, like that of acetification, is a true growth. As shown by F. H. Storer, in a recent number of *Science*, the practical application of this fact was made use of as long ago as 1686, when Sewall speaks of the necessity of getting "seed petre or mother of petre" to make a successful saltpetre bed. When these "saltpetre yards" were worked in Europe in order to obtain the nitrate for the manufacture of gunpowder, and it was desired to start a new yard, it was said to be necessary to insure success to bring some earth from an old yard and mix it with the new earth.

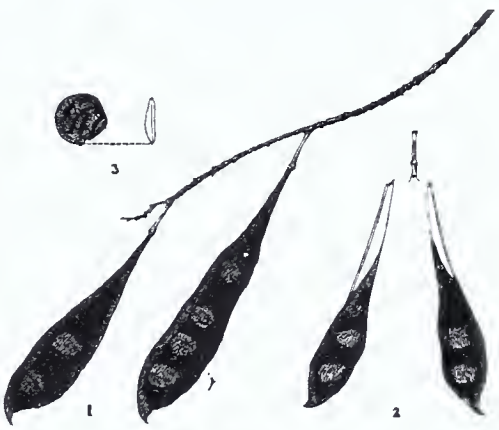
The organism which acts as the nitrifying ferment has been shown by Schlösing and Müntz to consist of very minute round or slightly elongated corpuscles, existing either singly or joined in couples; being of slow growth, and multiplying by budding. Dr. A. Springer, in the last number of the Proceedings of the Ohio Mechanics' Institute, describes some experiments of his own, in which the nitrates in an infusion of certain roots of plants were dissociated and nitric oxide evolved through the action of a fer-

ment composed of small cylindrical rods which moved rapidly across the field of the microscope with a wriggling motion, often bending themselves to form a circle. This may be the same as that mentioned by Bechamp under the name of *Microzyma cretæ*. In the same journal, Professor R. B. Warder gives a list of papers referring to the influence of bacteria upon the changes of nitrogenous compounds.

That the natural nitrates are the result of a fungoid growth is a fact interesting to mineralogists as well as to chemists, biologists and naturalists generally.

BOTANY.[1]

Dispersion of Seed by Wistaria.—In January of the present year I gathered a few pods of the Chinese Wistaria (*Wistaria consequana* Benth.), and placed them in a vase on the mantel shelf. A few evenings after, while sitting at a table in the center of the room, with my back towards the mantel, I was startled by a loud, snapping report, and the consciousness that something struck against the ceiling directly above my head, and then against a window shade at the extreme end of the room. I imagined that this circumstance was caused by the explosion of an unusually refractory piece of coal in the stove, which was burning at the chimney behind me, with the door wide open. But I soon discovered that the smallest of my Wistaria pods, Fig. 1, had ruptured, and that the flying missile was one of its enclosed beans, which I found on the floor a few feet from the window, where it had rebounded after striking the shade. Fig. 3 represents this bean with its spiral lines of dark shading, and also gives a transverse section. All the figures are drawn one-third of the natural size. The valves of the pod in question, as shown at Fig. 2, turned entirely inside out at their lower extremity, and separated from their pedicel, not at the well marked juncture, but at a little distance below it. The other pod of the same raceme was wrapped in paper and laid away. A few days after I happened to hear the noise occasioned by its rupture, and found it had separated from its pedicel in the same manner, that is, about half an inch below the joint. This



Wistaria Pods.

[1] Edited by Prof. C. E. Bessey, Ames, Iowa.

Wistaria bean, above mentioned, was thrown violently for a distance of sixteen feet and rebounded four feet. If it had been ejected with the same force from the position in which it grew on its native vine, it certainly would have flown for a distance of at least thirty feet. At all events, its enclosing pod proved itself to be an energetic vegetable catapult.—*Rev. J. L. Zabriskie, Nyack, N. Y., March, 1883.*

ADDENDUM TO ARTICLE ON THE COMPASS PLANT (*Silphium laciniatum*).—In the NATURALIST for August, 1882, to the list of papers on the subject, at the end should be added:

THOMAS HILL, LL.D.—Proceedings of Am. Ass. for Adv. of Science at Troy, August, 1870, p. 285.

THOMAS MEEHAN—Proceedings of Acad. of Natural Sciences Phila. for 1870, pp. 117–118.

——do. for 1875, p. 270

——Flowers and Ferns of the U. S., with colored plate of the plant, 2d series, 1880.

The extract on page 634 from paper by Francis Darwin in Journal of the Linnean Society, Vol. XVIII, No. 112, 1881, has some errors and omissions. It was copied from another journal. Now that I can copy from the original I give in full his conclusion of experiments "On the power possessed by leaves of placing themselves at right angles to the direction of incident light." He says, p. 449: "Thus the result of the experiments with the klinostat is on the whole to confirm the view published in the 'Movements of Plants' [by Charles Darwin, pp. 438–444], that the power which leaves have of placing themselves at right angles to the incident light, is due to a specialized sensitiveness to light, which is able to regulate or govern the action of other external forces, such as gravitation, or of internal forces such as epinasty."

He defines, p. 421, the terms epinasty and hyponasty, employed by De Vries and himself, as follows: "An organ is said to be epinastic when the longitudinal growth of the upper half or upper face exceeds the growth in length of the lower half; epinasty, if unopposed will therefore result in the organ becoming convex above and curving downwards.—Hyponasty is the reverse of epinasty, that is to say, the organ curves upwards owing to the lower increasing more than the upper half in length."—*Benjamin Alvord, Washington, D. C.*

AN APICAL CELL IN GYMNOSPERMS.—One by one the old characters relied upon to distinguish the cryptogams from the phanerogams are disappearing. We have long supposed that in the development of the stems and roots of phanerogams we had one character which could be considered reliable. The growing point (*punctum vegetationis*) in the cryptogams is a single cell, which by repeated fission gives rise to the mass of cells making

on its banks, between Zarizyn and Sarepta. *Elephas primigenius*, *Bos priscus*, Elasmotherium, *Camelus knoblochi* and several antelopes, stags, etc., are among the contents.——Remains of animals, the bones of which have apparently been broken by man, together with many stone implements, have been found in the crevices between the blocks of lava underlying a pumicestone pit near Andernach, on the Rhine. As the pumicestone filled the crevices to a depth of two or three feet, and the bones, etc., were beneath this filling-in, it is believed that there was a settlement on the spot, the food-remains from which fell into the crevices *before* the deposition of the pumicestone.——On the Middle Ural M. Malakhoff has explored the lake dwellings of the neighborhood of Ekaterinburg, and has discovered close by Irbit, very interesting accumulations of bones, lake dwellings on Lake Ayat, and stone and bone implements in a cavern close to the Mias ironworks.

MINERALOGY.[1]

New Minerals.—I. *Jéréméiéwite* is a new mineral discovered by M. Jéréméiew in Southeastern Siberia, and named after him by Damour.[2] It occurs crystallized in regular hexagonal prisms, transparent and nearly colorless. Its hardness = 6.5 ; specific gravity 3.28. It has a vitreous fracture and is without cleavage. At first sight it resembles beryl, tourmaline or apatite.

Before the blowpipe it loses its transparency, blanches, and gives to the flame the green color characteristic of boric acid. It is with difficulty attacked by acids. With cobaltic nitrate, after heating, it takes a fine blue color.

It is essentially a borate of alumina with a small proportion of iron. A mean of three analyses gave :

B_2O_3	Al_2O_3	Fe_2O_3	K_2O		
40.19	55.03	4.08	0.70	=	100.

yielding the formula $(Al_2O_3, Fe_2O_3)\ BO_3$.

II. *Picro-epidote* is a name proposed by Damour to designate a variety of epidote from Lake Baikal, Siberia, which has magnesia as a base and is infusible. It occurs in white or yellowish-white small crystals in lapis lazuli. Des Cloiseaux has shown that the crystallographic and optical characters are those of epidote.

III. *Dumreicherite* is a new mineral of the alum group described by Dr. C. Doelter[3] as occurring in crevices in lava in the form of superficial crusts. It was apparently monoclinic, but had a

[1] Edited by Professor H. Carvill Lewis, Academy of Natural Sciences, Philadelphia, to whom communications, papers for review, etc., should be sent.

[2] Bulletin Soc. Min. de France, T. VI, p. 20, April, 1883.

[3] Zur Kenntniss der vulcanischen Gest. u. Min. d. Capverd'schen Inseln.

fibrous structure. It is readily soluble in water, and has an astringent taste. Its composition, according to Kertscher, is:

SO_3	Al_2O_3	MgO	H_2O	NaCl		
36.65	7.14	11.61	45.01	tr.	=	100.41.

giving the calculated formula $4\ MgSO_4 + Al_2S_3O_{12} + 36$ aq.

Recent Lithological Work.—It is daily becoming more evident that a classification of rocks either by their chemical composition alone or by the minerals they contain, is artificial and unsatisfactory, and that a true basis of classification is to be found only by combining the general characters of rocks with their mode of occurrence as elucidated by field work. Lithologists are finding that the microscope and the laboratory are not all-sufficient, but that observation of the geological relations of the rocks is of the first necessity. Lithology thus rises to a higher sphere, and not content with giving a multitude of names to rocks of varying texture and in different stages of decomposition, is becoming one of the most important methods of geological research.

Perhaps no one is striving more earnestly toward the establishment of this broader method of lithological work than Dr. M. E. Wadsworth, of Cambridge. In a forthcoming work to be published by the Museum of Comparative Zoölogy, he dwells upon the importance of grouping the characters of rocks, rather than taking any one character as a basis of classification, and compares the usually received classifications with the Linnean artificial botanical classification.

In the same essay certain conclusions are reached which are of much interest, and are often widely at variance with generally received theories. He holds that the interior of the earth is now liquid, that eruptive, volcanic and plutonic rocks are derived from original liquefied material, not from sedimentary deposits, and that our crystalline rocks are the result of the metamorphism of eruptive rocks rather than of sedimentary rocks. He holds that meteorites and the recent volcanic rocks are the only rocks which have not been altered, and makes them his basis of classification. He seems to hold that even the gneisses have been altered from eruptive, volcanic rocks. Meteorites are regarded as having been derived from a hot, liquid mass, rather than from a gaseous or solid body, and it is suggested that they may have come from the sun. The appearance of the memoir in full is awaited with interest.

Charcoal as a Precipitant for Gold.—Mr. Wm. Morris Davis[1] (Sr.) has discovered a novel and most interesting method for separating gold from its solution by employing charcoal. He has found that charcoal has a remarkable energy in causing the

[1] Journ. Franklin Inst., April, 1883.

precipitation of gold from its chlorine solution, while other metallic and mineral constituents of the same solution are unaffected. The gold is thus both deposited and refined. All that is necessary is to pass the solution of the gold ore through a charcoal filter, when the gold in a pure state is deposited upon the charcoal, which may then be burned and a button of gold readily obtained.

This discovery, so simple in its method, was at first ridiculed by chemists. Repeated experiments have, however, shown its efficacy. Not only are no other substances than gold thus deposited, but the gold itself is completely separated from its terchloride solution, the liquid after having passed through the charcoal containing not even a trace of gold. As copper is not affected by the passage through the charcoal filter, that metal may be afterwards deposited by contact with scrap-iron. Silver would already have been precipitated as chloride in the original solution. By this process, therefore, gold, silver and copper may each be separated by most inexpensive methods from the same solution.

The explanation of the remarkable property of charcoal here described, lies in the fact that, as shown by experiment, it has the property of converting chlorine into hydrochloric acid. It oxidizes at the expense of the water, and liberates hydrogen, which unites with the chlorine. It follows, therefore, that the gold is deposited, not from any affinity for carbon, but simply because the chlorine in which it was soluble has been taken away to form hydrochloric acid, in which gold is insoluble. It also follows that copper and other metals soluble in hydrochloric acid are not affected by the conversion.

Crystallized Serpentine from Delaware.—Professor H. C. Lewis[1] has described certain crystals of serpentine which occur in the deweylite of Way's quarry, Delaware. The deweylite contains angular fragments of quartz, such as would be produced by throwing a heated quartz crystal into cold water. It also contains rounded masses of feldspar which are more or less altered into deweylite. The deweylite is thus shown to be probably the result of the alteration of graphic granite.

The crystals of serpentine, of a smoky pearl color, have a micaceous cleavage, and in the polariscope are shown to be biaxial with a small optic-axial divergence. The physical and chemical characters, including an analysis by Mr. Haines, are given, and the mineral is proved to be a true serpentine. The cleavage and the optical characters show that it is crystallized.

The Fluorine Minerals.—In an extended review of the fluorine minerals, by Professor P. Groth,[2] our knowledge of these

[1] Proc. Acad. Nat. Sci. Phila., Feb., 1883.
[2] Zeitschr. f. Kryst., etc., VII, 4th and 5th Nos.

minerals is rendered much more exact. He treats with especial detail the cryolite group of minerals. *Cryolite* is shown to be monoclinic instead of triclinic. *Pachnolite* and *thomsenolite* are shown to be species distinct from each other, the latter mineral containing one molecule of water, as already proved by Brandl.[1] The crystals of pachnolite are monoclinic, having generally the form of slender prisms, the prisms being striated horizontally. Thomsenolite has the same characters, both minerals decrepitating strongly when heated. Ralstonite, an isometric mineral, and chiolite, a tetragonal mineral resembling cryolite, have been re-examined and Brandl gives them new formulæ. Arksutite is shown to be merely a mixture of cryolite and pachnolite, and not a distinct species.

A Norwegian Dust Shower.—On the 26th of last February a fine dust was discovered overlying the snow in Trondhjem Amt (district of Drontheim), in Norway, and like the dust showers which followed the volcanic outbreak of 1876, was thought to indicate a recent volcanic eruption in Iceland. Dr. Reusch, of the mineralogical faculty of the University of Christiania, has, however, shown that it is not of eruptive origin, but consists of common sand, fine particles of quartz, hornblende and talc and some associated fine particles of vegetable matter. Although the volcanic origin of this dust has been disproved, it is nevertheless of interest, considering the wide extent of snow-covered country over which this dust was deposited.

Microlite from Elba.—A. Corsi[2] has found small crystals of microlite at several localities in Elba. It occurs in granitic rocks and is associated with albite, orthoclase, tourmaline, lepidolite, etc. The principal forms are octahedra and rhombic dodecahedra. In color it varies at different localities from dark, dirty green to yellow, and from being opaque to translucent, the transmitted light being reddish-yellow. The powder is grayish-white. The other characters are those usual to microlite.

Amelia County, Va., Minerals.—Professor W. F. Fontaine[3] contributes an interesting article upon the minerals of Amelia Co., Va., giving much information not heretofore published. The microlite and monazite, columbite, fluorite, beryl, orthite, helvite, etc., are each described in detail. In the description of helvite, which includes Mr. Sloan's analysis, Professor Fontaine omits to make any mention of the original discovery of that mineral by Professor Lewis.

The Wm. S. Vaux Collection.—This magnificent collection of minerals and archæological specimens, bequeathed under certain

[1] Amer. Naturalist for Jan., 1883, p. 76.

[2] Boll. R. Com. Geologico, 1881. 564.

[3] *Am. Jour. Sc. and Arts*, May, 1883.

conditions to the Philadelphia Academy of Natural Sciences, has finally been received by that institution. There are over six thousand trays of minerals in the collection, having an aggregate value of $40,000. Many of the specimens are of rare beauty and perfection, some of them being unique in those respects. The collection, the result of a lifetime's labor of love, represents the inorganic world in its most beautiful garb, and incites a higher appreciation of nature's handiwork. The academy has made alterations in its building so as to secure special rooms for the collection, over which a special curator is also to be appointed. The conditions of the gift are such as to surround the collection with every safeguard against depredation.

The archæological collection is estimated to be worth at least $10,000. It includes suites of specimens from almost all parts of the world, and is especially rich in relics of the Swiss lake dwellers, in pottery and implements of the American mound-builders, and in vases and idols from Mexico and Peru.

The sum of $11,000 is also given to be applied to the fitting up of cases, to the care of the collections and to the purchase of specimens and books.

BOTANY.[1]

New Western Grasses.—No full revision of North American grasses has been attempted in many years. The writer has been a careful student of the order, and has, during the past ten years, been accumulating material for its thorough investigation.

During the past three or four years many large collections of Western grasses, made by Howell and Henderson in Oregon, Suksdorf in Washington Terr., Parish, Cleveland and Lemmon in California and Arizona, G. R. Vasey in Arizona and New Mexico, Jones in Utah and California, Reverchon and Havard in Texas and Arkansas, Wolf in Illinois, and Gattinger in Tennessee, have been in my hands; and as the result several new species have been already published and a number of others are identified and will be described and published at an early day.

Professor Scribner, of Philadelphia, has also during the past few years been carefully studying the order, having been provided with the material of several collectors. We have freely consulted together, and tried to arrive at clear results, and it is our purpose jointly to publish as soon as possible a catalogue as full and complete as our material will permit.

Toward the furtherance of this object we would be glad of the assistance of all botanists and collectors in the communication of specimens and notes which may render our labors as effective as possible.

The following list indicates some unpublished species, most of which are based upon recent collections, a few, however, having

[1] Edited by Prof. C. E. Bessey, Ames, Iowa.

been several years in herbarium, and a few being modifications or changes of names for previously published species:

1. *Panicum autumnale* var. *pubiflorum.*
2. *Tripsacum lemmoni.*
3. *Aristida falmeri.*
4. *Stipa stricta.*
5. *Muhlenbergia wrightii.*
6. *Sporobolus wolfii* (*Vilfa minima*).
7. *Sporobolus interruptus.*
8. *Agrostis foliosa.*
9. *Agrostis exarata* var. *littorale.*
10. *Trisetum montanum.*
11. *Graphephorum wolfii* (*Trisetum wolfii*)
12. *Danthonia intermedia.*
13. *Bouteloua havardii.*
14. *Bouteloua pusilla.*
15. *Eragrostis neo-mexicana.*
16. *Poa kelloggii.*
17. *Poa flexuosa* var. *occidentalis.*
18. *Poa alsodes* var. *occidentalis.*
19. *Poa stenantha* var. *brevifolia.*
20. *Poa wardii,*
21. *Poa elongata.*
22. *Poa nevadensis.*
23. *Poa gracilis.*
24. *Glyceria lemmoni* (*Poa lemmoni*).
25. *Festuca jonesii.*
26. *Bouteloua burkii* F. L. S.
27. *Deyeuxia tweedii* F. L. S.
28. *Melica fruticosa* F. L. S.
29. *Muhlenbergia dumosa* F. L. S.

—*George Vasey, Depart. of Agric., Washington, D. C., March 6.*

Memorandum as to the Compass Plant.—My correspondent, Rev. Dr. Thomas Hill, LL.D., formerly president of Harvard, now at Portland, Maine, thinks the stages of growth of the seedling of the compass plant (*Silphium laciniatum*) should have accurate and repeated observations, and a report of the direction of the young leaf at various dates. He made such observations in 1870, and reported them to the Troy meeting of the Am. Ass. for Adv. of Science in August, 1870 (see page 285 of Proceedings). He writes me that the drought of that summer was unfavorable, and wishes that such experiments could be tried again and minutely observed and reported. He planted in north and south rows, but (not trusting that) he says, "over the seed bed I stretched as soon as I had planted the seeds, some white cotton threads, as exactly in north and south direction as I could. Then I had simply to measure by a paper protractor the angle made by the young leaves with the threads. They should grow into rich, damp ground and be fairly exposed to light on all sides. Measure at the end of each week, keeping a record—a table." He says, "they began to turn towards the meridian when about four inches high, twisting the petioles in the whole length as they do so."

In his letter he makes a diagram, grouping together what were their directions at different dates; when very young pointing in *all* directions, but as they grew passing nearer and nearer to the meridian.—*Benjamin Alvord, Washington, D. C.*

Classification of the Uredines.—Mr. C. B. Plowright has been studying the British plants of this group—the rusts, as they are familiarly called—and has embodied the results in a paper

phenomena in the region of the South Bavarian high plateau, and also in the Bavarian Alps," to Dr. A. Penck, of the Munich University. The work treats of the last glaciation of Upper Bavaria and North Tyrol, of older glaciations in the same districts, and of the formation of the Upper Bavarian lakes. A complete description of the effects of ice action in the defined localities, is given, also a comparison with those of North Germany and Scandinavia, and the concluding chapter has an able discussion on the causes of the Glacial epoch.——At a recent meeting of the Geological Society of London, Mr. D. Mackintosh gave the results of observations on the positions of boulders relatively to the ground around and below them. His investigations were carried on near Llangollen (Wales) and at Clapham (Yorkshire) and his results are, that the average *vertical extent* of the denudation of limestone rock around boulders has not been more than six inches, and that this denudation has been at a rate of not less than an inch in a thousand years. This gives not more than 6000 years since the boulders were deposited.

Recent.—The Rev. A. Irving (*Geological Magazine*, April) gives the classification of landslips adopted by Herr Heini, of Zurich. These "Bergstürze" are either "Schuttrutschungen" or descents of water-logged accumulations from the mountain slope into the valley, a movement which sometimes produces striations simulating those of glacial action; "Schuttstürze," or emptyings upon the valley below of loose material, accumulated in a minor valley on the mountain side; Felsschlipfe," or loosenings of the upper strata, when the general dip is towards the valley, by the erosion of the lower part of the sides into a slope much deeper than the dip slope of the strata of the mountain above; and "Felsstürze," or the breaking loose from the sides of the mountain of huge masses of rock.

MINERALOGY.[1]

Scovillite, a new mineral.—Professors G. J. Brush and S. L. Penfield have described[2] an interesting mineral from the Scoville ore bed in Salisbury, Conn., which occurs as an incrustation on certain iron and manganese ores. The incrustation, one-sixteenth of an inch or less in thickness is sometimes botryoidal or stalactitic in form and in cross fracture has a radiated, fibrous structure. It thus resembles in its mode of occurrence similar coatings of gibbsite. It has a pinkish, brownish, or yellowish-white color, a silky to vitreous lustre on the fracture, but has a greasy look on the natural surfaces, resembling some varieties of chalcedony or smithsonite. Hardness=3. 5. Specific gravity 3.94–4.01.

[1] Edited by Professor H. Carvill Lewis, Academy of Natural Sciences, Philadelphia, to whom communications, papers for review, etc., should be sent.

[2] *Amer. Journ. Sc. and Arts*, June, 1883.

Fused with salt of phosphorus and borax it gives a remarkable rose-colored bead in both flames. It is soluble in acid. The following mean composition was obtained:

P_2O_5	(Y_2O_3,Er_2O_3)	(La_2O_3,Di_2O_3)	Fe_2O_3	H_2O, (combined)	H_2O (lost at 100°)	CO_2
24.94	8.51	55.17	.25	5.88	1.49	3.59 = 99.83.

Regarding the CO_2 as unessential and due to an admixture of lanthanite, the composition of the remaining mineral is calculated as follows:

P_2O_5	$(Y,Er_2)_2O_3$	$(La,Di)_2O_3$	Fe_2O_3	H_2O
30 12	10.28	55.73	.30	3.57 = 100

The mineral is therefore a hydrous phosphate of the cerium and yttrium metals and is a new species. The mineral churchite approaches it most nearly in composition. The name Scovillite is proposed for it, after the locality where it was found.

The artificial formation of Minerals and Rocks.—Nearly all the interesting researches that have been made in forming minerals by artificial means are due to the chemists and mineralogists of France. Among these none are of more importance than those performed by Messrs. Fouqué and Michel-Lévy in the formation of various volcanic rocks and minerals through fusion. Recently they have collected their researches, heretofore scattered in several periodicals, in the form of an important volume entitled "Synthèse des mineraux et des roches." They employed platinum crucibles encased in fire clay and kept at a high heat for several days by means of a gas blast. By making use of the principle that minerals crystallize from the fluid magma in the inverse order of their fusibilty, and by keeping the melted minerals at different temperatures, carefully chosen, a number of artificial products closely resembling natural minerals and rocks were produced. Thus from a fused mixture of anorthite and augite, plagioclase crystals were obtained by a white heat, kept up for forty-eight hours, and on a second heating at a lower temperature augite crystals were formed, and the characteristic structure of an ophitic diabuse was obtained.

Most of the basic basaltic rocks were thus artificially formed by one or more fusions of a mixture of minerals. The acidic rocks, or those containing quartz, orthoclase, muscovite, hornblende, &c., could not thus be produced. An amorphous or glassy mass was obtained, and the latter minerals would not crystallize out of a fused mass.

The interesting conclusion is therefore reached that granite, gneiss, and other acidic rocks, with their enclosed minerals are not the result of igneous fusion. This is in accord with the generally accepted belief of geologists, derived from many considerations.

Concretions in Meteorites.—Dr. J. L. Smith[1] describes a number of nodular or globular concretions which occur in metecrites, and states that the presence of such concretions is the general rule in meteoric iron.

The most common concretions are of troilite, a sulphide of iron. These have a dark bronze color and are numerous and often of large size. The troilite is often penetrated by a bright yellow mineral known as schreibersite, a phosphide of iron and nickle. Graphite also sometimes forms nodular concretions, and is commonly mixed with troilite. Daubreelite is another interesting mineral mixed with troilite, being a sulphide of iron and chromium. A concretion of chromite was found in one meteorite. The chromite was black, but a thin section under the microscope was of a deep red color. Lawrencite, a green protochloride of iron, and aragonite also occur in meteoric iron, the aragonite, however, being probably of secondary origin.

Dr. Smith thinks that the presence of these concretions indicates a former plasticity of the iron, caused by great heat.

Mineralogical Notes.—A new edition of E. S. Dana's Text book of Mineralogy has just been issued. The list of new minerals is brought up to date, and much important matter relating to the crystallographic and optical characters of minerals and to new instruments has been added.——A report on Virginia minerals by Mr. A. S. McCreath of Harrisburg, recently issued, contains numerous new analyses of ores, coals, &c., and will be of great value to practical men.——A variety of wad, to which the name *lepidophæite* has been given, occurs in Thuringia in fibrous or scaly masses, with silky lustre. It has a reddish brown color and soils the fingers when touched. It contains eleven per cent of oxide of copper.——Gonnard has described an occurrence of *gedrite* in the gneiss of Beaunan, near Lyons. The mineral is in almond shaped masses, with lamellar or fibrous structure. The color is straw yellow to brown, and its characters are those of an anthophyllite containing alumina.——An *emerald* from Paavo, in Finland, analyzed by F. J. Wiik, was surrounded by a zone of radiated red albite, and this again by a yera of muscovite. ——*Wollastonite* has been obtained artificially by L. Bourgeois by melting together the required amounts of lime and silica at a bright red heat and cooling for two days in a furnace. A mass of acicular crystals was obtained, which, however, had optical properties unlike those of the natural mineral.——*Siderite* of a light green color occurs on hematite in the Lake Superior district, and is often associated with calcite. It is found either in crusts or in single crystals.

[1] *Amer. Journ. Sc.*, June, 1883.

BOTANY.[1]

NOTES ON THE STUDY OF FUNGI.—In view of the increasing interest in the study of mycology in this country some general remarks on this subject may not be out of place. In the first place, of course, here as elsewhere the question of *utility* comes up. The reply to this question given by Battarra, an Italian botanist of the eighteenth century, is still applicable. In his "Fungorum Agri Ariminensis Historia," published in 1755, in the chapter concerning the utility of Fungi, he says:

"Since everything placed on the earth by the wisdom of the Creator has been created through some wise design, and since all other productions contribute in some way to the uses of living beings on the earth, it cannot rationally be denied that Fungi also were intended to serve some good purpose, for the ideas of the unlearned crowd who regard these productions as of no account, and think that the tribe of Fungi might all be destroyed without causing any derangement in the economy of nature, and without detriment to the living beings on the earth, cannot be accepted by those who believe that God and Nature made nothing in vain. We have to admit that the utility to be found in Fungi is not of the highest, yet this is not the fault of these productions themselves, but arises rather from the pride of men and their unwillingness to spend time and thought on those things which God in His wisdom was not ashamed to make.

"To specify more definitely then, in the first place, Fungi furnish an abundant supply of food to many tribes of insects" [a plea which will find no great favor with agriculturists, I suspect], "nor are they to be rejected as a means of sustenance for man. The mushroom, for example, and the morel and various other kinds of esculent Fungi furnish an article of diet highly prized even on the tables of the rich."

Thus far Battarra, whose reasoning has lost none of its force up to the present time. But whatever opinion we may hold as to the absolute utility of Fungi themselves, it is certain that recent investigations into the habits and mode of growth of some of the parasitic species have enabled us to combat with more or less success their ravages on our cultivated crops, though it must be confessed that our knowledge is not yet accurate enough to enable us to control them with any great success. The "potato rot," the "grape rot," the "cranberry rot," and the various blights, moulds and mildews with which we have to contend still remain to vex and plague us, and it certainly requires much faith and a strong imagination to believe that these pests, the parasitic Fungi, really serve any good purpose in the economy of nature. Throwing aside, however, the question of their utility as one which cannot yet in all cases be satisfactorily answered, we

[1] Edited by PROF. C. E. BESSEY, Ames, Iowa.

THE "THIRD TROCHANTER" OF THE DINOSAURS.—M. L. Dollo has recently instituted a comparison between the trochanters upon the femur of Iguanodon and those of Anas, Bernicla and Cygnus, and announces his conclusion that the so-called "third trochanter" of the former (and of other Dinosaurs) is found also in the avian genera mentioned. The great resemblance between the dinosaurian and avian femur was noted by Huxley in 1870, and has been generally admitted, but the absence, in most birds, of the third trochanter, which is so conspicuous a crest in Iguanodon, has been a difficulty.

M. Dollo figures, side by side, the femur of *Cygnus atratus* and that of *Iguanodon bernissartensis*, and the proof is evident that the bird possesses the same trochanter—the position is the same, the form very similar, but the size relatively far inferior.

Dissection proved that the duck's third trochanter serves for the insertion of the caudo-femoral muscle, which, as shown by Meckel, is the agent in the curious lateral movements made by the tail of the duck; and also for the insertion of the ischio-femoral muscle.

The difference in the relative dimensions of the trochanters is, therefore, correlated with the difference in size of the tails of the two animals. The enormous tail of the Iguanodon needed for its movement a massive muscle, instead of the thin slip present in the duck and swan.

Hesperornis, a bird so reptilian in many respects, ought, therefore, to have this trochanter, and M. Dollo remarks that although Professor Marsh did not note its significance, it is plainly shown in Plate XIII of that author's work on the Odontornithes.

This trochanter cannot be homologized with either of the three trochanters found in mammals, since it serves for the insertion of a totally different set of muscles from those attached to either of them, and M. Dollo therefore proposes to distinguish it as the "fourth trochanter."

THE PUERCO FAUNA IN FRANCE.—Dr. Lemoine has published the second part of his Researches on the Fossil Birds of the Inferior Tertiary of the neighborhood of Reims. In an introduction he distinguishes the two faunæ of the north of France, which represent the beginning of the Tertiary, the Cernaysienne and the Suessonienne. These correspond with remarkable equality to the Puerco and the Wasatch faunæ, which I discovered on this continent. Not a few of the genera are common to the two continents, but the extent of the identity cannot be fully understood in the present state of our knowledge of the respective forms. Those of the Cernaysian fauna, as given by Lemoine, are the following: *Mammalia:* Heteroborus, Hyodectes, Hyænodictis, Lophiodochœrus (?), Pleuraspidotherium, Plesiadapis, Adapisorex, Ptilodus; *Reptilia:* Champsosaurus, crocodiles, turtles and Lacer-

tilia; *Aves: Gastornis edwardsi, Remornis heberti, Eupterornis remensis* Of the above, two genera, Ptilodus and Champsosaurus appear to be absolutely identical in France and New Mexico; some of the others have near allies in New Mexico, but of identity there is not yet certain evidence.

In Europe, as in America, the Suessonian epoch ushers in the genus Coryphodon. Hyracotherium also appears (*Pachynolophus gaudryi* Lem., is a Hyracotherium), and Pliolophus. A number of other genera are probably identical in North America and France, as Miacis, Opisthotomus, Phenacodus, and Pantolestes, with Lophiodon and Dichobune, not yet found in America. Hyænodictis and Plesiadapis hold over from the Cernaysian fauna.

Uniformity of nomenclature requires that the Suessonian, introduced by D'Orbigny, should replace the name Wasatch, which was given by Hayden many years later.[1] In like manner the Cernaysienne of Lemoine is identical with the Puerco of Cope, and the latter name has six or seven years priority. So also the genera Ptilodus[2] and Champsosaurus[3] were named first in America.

The genus Gastornis proves to be one of the most remarkable which palæontology has brought to light. It is the only bird known, in which the cranial sutures are persistent, and it has indications of a tooth in the position of the canine of the Mammalia. It is nevertheless a true carinate bird with reduced wings and complete tarsometatarse. The height of the *G. edwardsi* is about two and a half meters.

Note.—Since the above was written a well illustrated paper from the Bulletin of the Geological Society of France has come to hand, which describes the species of Neoplagiaulax Lem. The type, *N. cocænus*, differs from the *Ptilodus mediævus* in lacking the third premolar tooth from the lower jaw.—*E. D. Cope.*

MINERALOGY.[4]

Empholite, a new Mineral.—M. L.-J. Igelström[5] has recently described a new mineral from Hörrsjöberg, Sweden, which, occurring in minute, generally microscopic crystals, has received the name empholite, from ἐμφωλεύω, to hide.

The crystals are white, transparent, and very brilliant, having a hardness of 6 or over, and belonging to the orthorhombic system. They have an easy cleavage parallel to the crystallographic

[1] See American Naturalist, 1877, p. 95.

[2] This genus was described in the Naturalist for Nov., 1881 (published October 28). The first description of the genus in France (as *Neoplagiaulax* Lem.) bears date Nov., 1882, although its discovery was announced in 1880.

[3] Proceeds. Philadelphia Academy, Dec., 1876. Described by Gervais as *Simædosaurus*, Journal de Zoölogie, Feb., 1877.

[4] Edited by Professor H. Carvill Lewis, Academy of Natural Sciences, Philadelphia, to whom communications, papers for review, etc., should be sent.

[5] Bull. Soc. Min. de France, T. vi, p. 40.

axis, and occur in narrow prisms, either as radiated aggregates or as fibrous masses, filling cavities in damourite or pyrophyllite. The crystals are ordinarily so disseminated and so small that they are perceived with difficulty. They frequently occur in fibrous masses like cyanite. In fact, they were at first thought to be cyanite.

With cobalt solution a fine, blue color is obtained after heating. The mineral is insoluble in acid, except so far as a yellow discoloration of the liquid is produced by the contained iron. Heated in the matrass, water is given off without decrepitation. The mineral turns slightly yellow on exposure to the air. It has a fibrous appearance under the microscope. In its infusibility, its hardness, its cleavage, and, as Bertrand has shown, in its angles, the mineral is similar to cyanite.

Its composition, however, shows it to be a distinct species. The following is a mean of two analyses, after subtracting 16 per cent. of gangue:

SiO_2	Al_2O_3	MgO,CaO,FeO	H_2O	
50.5	31.9	3.4	14.2	= 100

giving the formula Al_2O_3, 2 SiO_2 + 3 H_2O.

Empholite appears to be a more hydrous variety of the new mineral davreuxite.

The Cornwall Tin ores.—Mr. J. H. Collins contributes to the *Mineralogical Magazine*[1] his third paper on the tin ores of Cornwall, England. The associated minerals are much the same as in the other tin-producing districts of the world. Tourmaline is a very common associate of cassiterite, and appears to be of contemporaneous origin. So also are quartz, mica, feldspar, and sometimes apatite, topaz, garnet, hornblende, &c. Of more recent origin, being deposited on top of the cassiterite, are the sulphides of iron, copper, lead, and zinc, the oxides of iron, the carbonates of lime, copper, etc., and many other species.

The mineral known as Gilbertite, a greenish-yellow hydrated mica, almost invariably occurs with the Cornwall cassiterite. It is generally regarded as a variety of margarodite, but Mr. Collins thinks that it is a distinct species. It occurs massive, and also in spherical masses with radiated concentric structure, or in stellate groups, and sometimes in six-sided tables. Hardness, 1–2.5; specific gravity, 2.6–2.82. It has a greasy feel, like talc. At a high temperature water is given off. The analyses given closely correspond to the composition of margarodite.

As to the origin of the tin ores, the conclusion is reached that they have all been deposited in their present positions from stanniferous solutions, all being of aqueous origin. The presence of fluorine probably helped to keep the tin in solution. The tin was

[1] Vol. v, p. 121.

probably originally derived from the surrounding rock, and afterwards deposited by thermal waters in fissures.

In this connection a valuable paper in the *American Journal of Science* on the Genesis of Metalliferous Veins, by Professor Joseph LeConte, is of much interest in confirming this theory of vein formation. Metalliferous deposits are now being formed in California and Nevada, at Sulphur Bank and Steamboat Springs, through the action of up-coming solfataric waters. Even cinnabar, generally supposed to have been formed by sublimation, is thus deposited from aqueous solution. The metals are deposited from solution in hot waters holding alkaline carbonates and sulphides, probably by reason of cooling and relief of pressure aided by chemical action as the waters approach the surface.

Professor LeConte holds that gold has in like manner been deposited from an alkaline sulphide solution, and there are strong reasons for believing that this is the true explanation of our metalliferous vein deposits.

The Minerals of Skye.—Professor M. F. Heddle[1] has described a new mineral locality in the island of Skye. Quite a number of different zeolites occur in the igneous rocks, among them being thomsonite, farœlite, mesolite, stilbite, analcite, laumonite, chabazite, gyrolite, and apophyllite. Saponite of a pale red color, rarely oil-green, occurs in minute botryoidal groupings, and in thin, vein-like processes. Plinthite, a variety of bole, falling to pieces in water, occurs in various forms. It either occurs in beds of varying thickness among the strata, or in the form of clusters of spheres of the size of peas, or as a thin layer among the zeolites. Massive varieties of mesolite and of thomsonite, the latter sometimes called "rock soap," are also described, and several analyses are given.

Mineralogical Notes.—Mr. J. J. Dobbie directs attention, in the *Mineralogical Magazine*, to a variety of saponite from near Glasgow, which has some peculiar physical properties. The saponite has probably resulted from the alteration of a trap rock, and has a deep chocolate-brown color, a conchoidal fracture and the soapy feel so characteristic of most hydrated silicates of magnesia. It is dull, but may be highly polished by rubbing with the hand. When placed in water it splits into sharp angled fragments, ultimately crumbling. It has the chemical composition of saponite. ——Hausmannite has been produced artificially by A. Gorgen, and rhodonite by L. Bourgeois. Artificial hausmannite was made by heating chloride of manganese in an atmosphere charged with oxygen and steam, and rhodonite was produced by the fusion of equal parts of silica and binoxide of manganese.——Professor Des Cloiseaux has begun the publication of an extended article, in the June number of the Bulletin de la Soc. Min. de France, on the optical

[1] *Min. Mag.*, April, 1883, p. 115.

characters of some feldspars. More than 400 determinations of the optical constants of feldspars from numerous localities were made, including sixty-four varieties of oligoclase and andesite and thirty-seven varieties of albite. Only mineralogists who have been engaged in this kind of work can appreciate the labor involved. The results will be of importance in showing how far feldspars can vary from the type form while preserving their identity, and in distinguishing between such variations and the mixture or alternation of different species. Among the specimens examined is the moonstone from Mineral Hill, Penna., which is determined to be a *peristerite*, containing probably certain admixtures of oligoclase.——Some very beautiful transparent groups of apatite crystals have been found in the Untersulzbachthal, in Salzburg. They have a white color with a delicate tint of mauve. The largest of the specimens, so far found, has been deposited in the South Kensington Museum. They are beautifully terminated by a number of planes, and have an unusual luster.——The Oregon nickel ore is found in two varieties, which analysis has shown to be almost identical with the ores from New Caledonia—garnierite and noumeite. They also occur under precisely the same geological conditions. Garnierite has a pale apple-green color, adheres to the tongue, is not unctuous and falls to pieces in water. Noumeite is darker, does not adhere to the tongue, is unctuous, and does not fall to pieces in water. Noumeite contains more water than garnierite.

BOTANY.[1]

Ellis' North American Fungi.—In April the tenth and eleventh centuries of this important distribution were received, and a few days later Mr. W. C. Stevenson's Alphabetical Index to Centuries 1 to X. By means of the latter we are able to make a hasty analysis of the first thousand specimens. Running it hurriedly we note about half a dozen Myxomycetes and the same number of Mucorini. The Peronosporeæ are represented by three species of Cystopus and twelve of Peronospora. In the order Perisporiaceæ there are twelve species of Microsphæria, three of Erysiphe, and six of Uncinula. Tuberaceæ are represented by but a single species. Under Helvellaceæ the genus Peziza is represented by sixty-eight species, while of Pyrenomycetes there are of the principal genera as follows: Diatrype 14 species, Dothidea 13, Hypoxylon 13, Hysterium 11, Nectria 16, Sphæria 68, Valsa, 39. In the Uredineæ, Æcidium has 14 species, Phragmidium 4, Puccinia 19, Uromyces 15, and in Ustilagineæ of Urocystis 2, and Ustilago 5. Half a dozen or so species represent the Gasteromycetes, while of Hymenomycetes there are of Agaricus 10 species, Corticium 23, Hydnum 14, Irpex 5, Marasmius 9, Stereum 14. The order Saprolegniaceæ

[1] Edited by Prof. C. E. Bessey, Ames, Iowa.

is the only one of the ordinary Fungi which is not represented by specimens. It will be seen by the above that this distribution is one of great value to the student of any department of fungology, as the specimens are not confined to any restricted group of orders. The excellent index makes it an easy matter to find any species, and possessors of the work will thank Mr. Stevenson for compiling it.

Century XI is of unusual interest, as it is a special one devoted to the Uredineæ and Ustilagineæ. In it there are thirty-five species of Puccinia, which added to those in the previous centuries (all in Cent. III) make fifty-four species. Nine specimens of Ustilago and two of Sorosporium represent the Ustilagineæ. In this century a note informs us that the species "have mostly been determined by Dr. W. G. Farlow."

Since writing the foregoing, we have received a second valuable index also by Mr. Stevenson, and entitled "An Index to Habitats," giving in alphabetical order the habitats of the first thousand species. While not of as great value as the specific index, this will also prove to be useful.

Nectar in Spermogonia.—Rathay has shown that insects are attracted to the spermogonia of Uredineæ by a sweet secretion. Many species of insects have been seen to visit the spermogonia, and without question the spermatia are carried away by them. One would scarcely have expected such a device in plants so far down the scale of vegetable life.

Botany at the Minneapolis meeting of the A. A. A. S.—Botanists will find much to interest them in and about Minneapolis in August at the meeting of the American Association for the Advancement of Science. The collector will be able to add not a few strange Western plants to his portfolio without the trouble of making long trips. Upon or near the university campus he may get *Lygodesmia juncea*, *Artemisia frigida*, *Iva xanthiifolia*, *Petalostemon villosus*, *Pentstemon grandiflorus*, and many others of equal interest. The cliffs of the great gorge of the Mississippi river, just under the university, will entice many venturesome collectors, while others will find the less dangerous marshy land and the sand hills to the eastward not less interesting and profitable. The whole country westward and south-westward of the city is filled with ponds and lakes which teem with an unusual number of aquatic plants, especially of the lower orders. Desmids and Diatoms of rare beauty occur in great numbers, and ought to engage the attention of the microscopists. Charæ of several species abound, and will be in full fruiting stage at the time of the meeting. The larger fungi are likewise represented by an unusual number of species, while the rusts, smuts, mildews, etc., etc., sometimes denominated the micro-fungi, may be picked up almost everywhere. Surely the association has not for many

The primitive type remaining in the Loup Fork epoch is the Proboscidia.

Geological Notes.—*Jurassic.*—M. Cotteau, in the sixty-sixth issue of the *Paleontologie Francaise*, describes the Jurassic species of the echinid genera Hemipedina and Cyphosoma. The latter genus attains its greatest development in the Turanian and Senonian stages of the Cretaceous, and is rare in the Jurassic.

Tertiary.—In Palæontological Bulletin, No. 36, Professor Cope adds to the fifty-five species of vertebrates of the Puerco epoch the ophidian *Helogras prisciformis*, and the mammals *Triïsodon levisianus*, *Mioclænus ferox*, *M. bucculentus*, *M. subtrigonus*, and *M. corrugatus*, two species of Mixodectes, new species of each of the genera Periptychus and Phenacodus.——MM. Schlumberger and Munier-Chalmus have proved that two species of Biloculina, now living in the Atlantic, are dimorphic, and have since ascertained that several Eocene Miliolidæ (Triloculina, etc.) are also dimorphic. The dimorphism, present in all the Miliolidæ examined, consists of a central chamber much smaller and surrounded by a greater number of chambers than the usual form. No young individuals of this second form have yet been found, and this fact tends to show, what from the character of the change is quite possible, that the form B is a final evolution of the form A.——Mr. J. L. Wortman, of Philadelphia, has published in the *Revue Scientifique* a most thorough account of the genealogy of the horse, illustrated with numerous engravings. Beginning in the Lower Eocene, he traces upwards the equine line through animals belonging, by the structure of their feet, to the Taxeopoda through the Lophiodontidæ, Chalicotheridæ and Palæotheridæ to the true Equidæ. The first traces of the preponderance of the central digit are found in the taxeopod Phenacodus; Hyracotherium follows, and the line then passes through the chalicothere Lambdotherium to Anchitherium, in which Palæotherid the foot has assumed an almost equine form. This genus belongs to the lower and middle Miocene, and in the beds immediately above it occurs Hippotherium, the incomplete fibula, small exterior digits, consolidated radius and ulna and horse-like teeth of which approximates it to Protohippus and to the true Equidæ, which follow in the upper Miocene, Pliocene and recent strata.

General.—Professor Hulke, in his anniversary address, reviews the work done during the year by the Geological Society. He notes as subversive of once generally received theories the fact that a much older fauna was found in the lowest of three gravel terraces in a river valley near Paris, than was afforded by the highest terrace; and also the illustrations repeatedly enforced to disprove the power of glaciers to excavate rock-basins.——Professor T. McK. Hughes has written graphi-

cally upon the relation of the appearance and duration of the various forms of life upon the earth to the breaks in the continuity of the sedimentary rocks. Postulating an earth-wave which should gradually force southward the depression of the Mediterranean, and thus convert Africa slowly into Europe, he endeavors to show what forms of life would be likely to persist. He then reviews some of the appearances and extinctions occurring in the various formations, and concludes that the sequence of life upon the earth points to the persistence of oceanic and continental areas, and to earth-movements of the nature of waves. The greatest breaks in the series of strata in England are those between the upper and lower old red sandstone, and between the Coal Measures and the Permian.

MINERALOGY.[1]

THE INFLUENCE OF LIGHT ON MINERALS.—It may not be generally known that many minerals lose their color or fade when exposed to light. Experienced collectors frequently keep their most finely colored specimens in a dark place. Fluorite is especially liable to fade. Amazon stone, however, sometimes gains in color when exposed to light. A greenish-gray feldspar from the graphic granite veins at Ammeberg has been found to assume a bright emerald green when exposed to the air. Experiments made by Erdmann, by placing fragments in sealed tubes and exposing them to light for a year, led to the conclusion that air and moisture had no influence, but that light alone effected the change in color.

RUTILE IN PHLOGOPITE.—The beautiful phenomenon of asterism is probably better shown in the well-known phlogopite of Burgess, Ontario county, Canada (often known as "star-mica"), than in any other substance. The flame of a candle looked at through a plate of the mica, appears as a six or twelve rayed star. As is shown by the microscope, this is due to the presence of minute linear crystals which cross each other at angles of 60°. The cause is the same as that which produces a two or four-rayed figure when a street lamp is looked at on a rainy night through an umbrella.

Mineralogists have long been puzzled to know precisely what these minute enclosed crystals are which thus produce the asterism, and they will be interested to know that they consist of *rutile*.

The needles are flattened and almost colorless in the Canadian mica, but in a mica from Bodenmais, Sandberger has found them of a deep reddish-brown color. Williams has also recently found needles of rutile in a magnesian mica which occurs in a mica diorite from the Black Forest.

[1] Edited by Professor H. CARVILL LEWIS, Academy of Natural Sciences, Philadelphia, to whom communications, papers for review, etc., should be sent.

A NEW USE FOR STRONTIANITE AND CELESTITE.—Quite a demand has recently sprung up for strontia minerals for use in separating sugar from molasses, especially for strontianite, and a good market is now open for that mineral. The strontianite is wanted for the preparation of strontium hydroxide, which has the property of precipitating sugar out of molasses. The mineral is ignited and then boiled with water, from which, on cooling, crystals of strontium hydroxide are formed. If this is heated with molasses and water a strontium saccharate is thrown down. This is filtered off, washed with a ten per cent strontium hydroxide solution, and then treated with water. It is thus decomposed and crystalline sugar is obtained on evaporating the filtrate.

"SULFURAIRES."—M. Plauchud, having shown that the presence of hydrogen sulphide in water containing vegetable matter is due to the action of some species of confervæ, which have the power of reducing sulphates to sulphides, formulates the theory that many of our natural mineral sulphides are due to the reducing action of this class of algæ. He sealed some of these algæ, which he designates "sulfuraires," between plates of gypsum, and after some months found granules of sulphur. Several other observers have noticed this chemical activity of certain algæ, and have shown that this action occurs only when the plants are alive.

CHLADNITE.—In 1846 Professor Shepard described under the name of chladnite a mineral which he regarded as a tersilicate of magnesia, which formed more than two-thirds of a meteorite which fell at Bishopville, S. C. The color of the mineral was snow-white, rarely tinged with gray, its luster was pearly to vitreous, it had a hardness of 6–6.5, specific gravity 3.116, and it fused readily before the blowpipe to a white enamel.

The meteorite was then investigated by W. S. von Walterhausen, who described the siliceous portion as containing ninety-five per cent of chladnite and the rest labradorite.

Still later Professor J. Lawrence Smith examined the meteorite, coming to the conclusion that chladnite was identical with enstatite. Rose and Rammelsberg also analyzed the chladnite, the latter stating that no feldspar was present.

Quite recently Dr. M. E. Wadsworth has examined the same meteorite and come to the conclusion that there is no such mineral as chladnite, and that it is an aggregate of enstatite, feldspar and augite; with traces of other minerals. The microscope clearly reveals the compound nature of the supposed mineral, which has a granitic structure and is a rock belonging to the gabbro variety of basalts.

That such diverse conclusions should thus be reached by the most able investigators seems indeed most strange. The conclusion of Dr. Wadsworth, undoubtedly the correct one, clearly

show the superiority of microscopical over chemical investigations in lithological work. Dr. Wadsworth supposes that the origin of the meteorite was similar to that of the terrestrial eruptive rocks. So many facts point to the essential unity of the universe that it is unwise to employ different names according as a rock comes from above or below. The name chladnite, either as rock or mineral, must therefore be abandoned.

NEW MINERALS.—M. Weibull describes as new three manganese minerals from Vester-Silfberg, Sweden, which occur with wad, manganesian garnet and manganiferous carbonate of lime.

Igelströmite, a silicate of iron and manganese, is a massive, dark-colored, crystalline mineral, having three cleavages, two of them distinct, and a vitreous to greasy luster. On the edges it is translucent with a yellowish color. Specific gravity 4.17. The composition is:

SiO_2	FeO	MnO	MgO	$CaCo_3$	
29.94	46.88	18.83	3.01	1.14	= 99.80

It appears to be merely a variety of knebelite, a mineral described more than fifty years ago by Döbereiner.

Silfbergite, apparently a manganiferous actinolite or anthophyllite, occurs in bladed crystals of a yellow color, resembling actinolite. Its cleavage, luster, hardness and specific gravity are about those of varieties of hornblende. Its composition is:

SiO_2	FeO	MnO	MgO	CaO	H_2O	
48.83	30.49	8.34	8.39	1.74	0.44	= 98.23

Manganhedenbergite, a manganiferous pyroxene, related to hedenbergite, is of a grayish-green color and has the general characters of the pyroxenes. Its composition is:

SiO_2	FeO	MnO	CaO	MgO	Na_2O K_2O	
48.29	24.01	6.47	17.69	2.83	0.22	= 99.51

From the descriptions given it would appear that these minerals are all merely varieties of well-known species. If new names must be given in such cases it is most desirable that in some way they should recall that of the more generic mineral of which they are the varieties. It will, indeed, not be long before all mineral species will be divided and subdivided into genera, species and varieties, as has already been done for garnet, feldspar, hornblende, mica, etc. A mineralogical text-book will then be something more than a catalogue. Meanwhile mineralogists, describing new species, should indicate, if possible, their generic position.

MINERALOGICAL NOTES.—Mineralogists frequently have to test for phosphoric acid in a mineral under examination, and generally use molybdate of ammonia acidulated with nitric acid as a reagent, as prescribed in works on determinative mineralogy. By

adding a small crystal of nitrate of ammonia to the solution, the reaction becomes more delicate and the formation of the yellow precipitate occurs more rapidly.——Large deposits of mineral manure have been discovered in Russia. The deposits consist of a green sandstone and sand known as ancella-schicht. The sandstone consists of fifty per cent of calcium phosphate, twenty-five per cent of glauconite and ten per cent of quartz. The sand has forty per cent of glauconite. The sandstone is cemented by calcium phosphate, and is a most valuable manure.——Dr. Wadsworth has examined a supposed meteorite found at Waterville, Maine, just after the passage of a meteor over the town. The fragment was a cinder-like mass, the surface of which was coated by a fused crust. Although a report like that of a small cannon had been heard at the time the meteor was seen in the sky, suspicion was attached to this stone from the fact that the grass on which it lay was unchanged in appearance. Professor Shepard had analyzed it, but regarded it as doubtful. Examination showed that it was a slag-like body, long exposed to the action of the weather, and containing in its cavities remains of plant fibers. The fluidal structure and the fused matters seen under the microscope, showed that it was merely a slag from some earthenware manufactory, and in no sense a meteorite.——Some curious crystals of fluorite have recently been noticed from Bohemia. The crystals were combinations of cube, hexoctahedron and octahedron, remarkable for certain rectangular markings on the cubic faces. It has been shown that these markings are due to a double growth of the crystal whereby a simple crystal was first formed, afterward to be enclosed in a more complex crystal which was built up around the first. It is thus an enclosure of fluorite in fluorite.——Professor J. S. Newberry has contributed interesting articles on the formation of coal and the origin of carbonaceous matter in bituminous shales. He describes a number of facts regarding the bituminous coal fields of the Mississippi valley which clearly show that the "peat bog theory" gives the true explanation of the origin of that great deposit, as opposed to an "estuary or raft theory" now advocated by some geologists. He holds that the carbonaceous matter in bituminous shales is due to the presence of algæ, which thus are the primary source of petroleum and mineral gas.

BOTANY.[1]

The Growth of Plants in Acid Solutions. II.—Before the plants could be analytically examined they became disarranged and some identifications lost. The following items are interesting:

The hydrochloric acid plant was examined for chlorine, the

[1] Edited by Prof. C. E. Bessey, Ames, Iowa.

whole plant being divided into three parts. The top, embracing leaves and portion of stem, contained .205 grains of chlorine; the middle or stem to within a few millimeters of the first roots, .1373 grains of chlorine; the roots, .102 grains of chlorine. The sum of these amounts gave 3.54 per cent of chlorine in the entire plant. The hydrochloric acid formed soluble chlorides which were taken up by the plant. The percentage of chlorine in plants, excluding strand or beach plants, seldom exceeds one per cent.

The parts of another plant similarly divided into top, middle and roots, gave, upon maceration in warm water, an alkaline reaction which when titrated with acid, yielded the following results: the titration of the top converted into decinormal alkali equaled .294 grains carbonate soda; the middle gave .0432 grains, and the roots .049 grains carbonate of soda, or considering the alkali as soda, 1.3 per cent of soda for the whole plant, a fairly average percentage for plants of this description.

The percentage of ash of the other plants was determined in order to observe if the use of acid waters had increased the mineral matter of the plant through its solvent action upon inorganic ingredients of the soil. This examination gave the following results:

	Wt. dried plant.	*Percentage ash.*
Water plant	1.1615 grammes.	19.11
Carbolic acid plant	.5135 "	16.60
Nitric " "	.536 "	16.79
Formic " "	.5535 "	18.15
Salycylic " "	.5885 "	17.00
Tannic " "	.6975 "	19.80
Tartaric " "	.9325 "	14.74

Considering the devitalized condition of the acid plants mentioned above and the decreased weights of the others in this table below that of the water plant, it is evident that the acid waters tend to introduce inorganic ingredients into the tissue of the plants.

During the last winter I have kept hyacinth bulbs in acid waters identical with those used upon the geranium plants, adding to them oxalic acid. The effect upon the plants was deleterious and destructive. The water plant flowered upon March 7th, having numerous roots, a tall flower stalk and leaves six inches long. The hydrochloric acid bulb died, as did the sulphuric acid subject, though one month later. No roots appeared upon any acid bulb except a few in the tannic acid solution. The plants were low, the flowers appeared without scapes, and the leaves attained under these adverse circumstances, at the best, a height of three inches.

On March 31st the tannic acid bulb flowered and the flowers were a dark purple, much deeper in color than those of the water plant. The bulbs were supposed to be one variety, having all one

erate—in all over 2000 feet. The strike of the whole series is E. W., the dip being a slight one towards the north. The richest gold washings of the Chapodão are along streams which run over the sandstone and conglomerates *above* the fossil beds.—*Herbert H. Smith.*

Geological Notes.—*Silurian.*—M. Lebesconte, on the occasion of the presentation to the French Geological Society of the posthumous works of Marie Roualt, gave the following reasons why Cruziana and Rysophycus, described by that geologist, should be considered to be vegetables and not the tracks of animals, as they were considered by M. Nathorst: (1) They are met with not only upon the lower surface of the beds but also upon the upper; (2) they occur even in the interior of the rock; (3) the great majority anastomose in a most intimate manner, showing plainly the points of junction, while the animal tracks that simulate vegetable forms are broken at the point of junction.

Devonian.—M. Oehlert has described in the Bulletin of the French Geological Society eight new crinoids from the department of Mayenne, including three Rhodocrinidæ, two species of Melocrinus, a Phimocrinus, a Lecanocrinus and a Hexacrinus.

Carboniferous.—M. Zeiller (Bull. Soc. Geol. France, May, 1883) gives the result of an examination of the coal beds of Tong-king. The flora of these beds differs somewhat from that of the coal beds of Europe, the greater part of Asia with China, and North America, and seems intermediate between that of these continents and that of Australia. The flora of the lower marine Carboniferous beds of Australia is similar to that of Europe, Asia and North America, and the coal beds of New South Wales must therefore be of Carboniferous age, to which also those of Tong-king belong.

Triassic.—M. Sauvage enumerates the fishes of the Muschelkalk of Lorraine, fourteen species in all.

Jurassic.—In a recent issue of the Bull. Soc. Geol. of France, M. Hebert discusses the beds containing *Terebratula janitor*, beds which he places in the Upper Jurassic, but with which M. Torcapel commences the Neocomian, and M. Parandier contributes a note upon the closed basins of the Jura mountains. These basins result from the crossing, in many directions, of dislocations of varying intensities. When the level of the interior of the closed basin is higher than that of the waters circulating outside of it, the rain water escapes by the fissures and tunnels, and penetrating through the fractures, makes its appearance outside the closed basin. This is the case with the basins of Saone and of Oroc, near Besançon, and with many others. When, on the contrary, the level of the bottom of the closed basin is below that of the waters exterior to it, these exterior waters penetrate into it along one of the lines of rupture, enlarging the fissure by their erosion.

In this manner the Donbs traverses the basin of Morteau, receiving a rivulet from its interior as it passes.——M. Cotteau also contributes a note upon the Jurassic echinids of Algeria, forty-seven in number. One only of these species is found in the Oxford stage; thirty-seven to the upper coralline, and seven seem to be Kimmeridgian. Nineteen are new and known only in Algeria, while the remainder occur in Europe, usually at the same stratigraphic levels.

Tertiary.—The cerebral hemispheres of *Arctocyon dueilii* and *Pleuraspidotherium aumonieri*, discovered by M. Lemoine in the Eocene of the environs of Rheims, are stated by that geologist to be so reduced in dimensions as to be scarcely superior in transverse diameter to the olfactory or the optic lobes, the latter of which are entirely uncovered.——M. Hebert (Bull. de la Soc. Geol. de la France, 1882) has described in detail the nummulitic group of the south of France. This group belongs to the Middle and Upper Eocene, and occurs in the Central Pyrenees, at Chalosse, at Corbières and Montagne Noire, and in the environs of Nice.

General.—Mr. G. K. Gilbert states that the great fault along the western base of the Wasatch mountains is wanting opposite Salt Lake City. He suspects that the fault will yet be completed at that point, and that when the slip occurs it will cause an earthquake which will destroy Salt Lake City.

MINERALOGY.[1]

Experimental Studies upon Rocks.—M. J. Thoulet,[2] after deploring the absence of general results arrived at by lithologists, has proposed to himself the study of all the physical properties of the same rock in order that, by a comparison of the data thus obtained, any relations which exist between these diverse properties may be discovered, and at all events the physical constants of the rock may be systematically stated. He holds that lithology should be systematized by the common application of both the physical and natural sciences to the study of the genesis of rocks, and shows the necessity of obtaining, in the first place, exact figures upon which to found satisfactory conclusions.

He gives the physical properties of a basalt and of a compact limestone, enumerating succinctly the locality, the macroscopic and microscopic appearance, specific gravity, chemical composition, *hygrometricity* or amount of moisture ordinarily contained, *imbibition*, or faculty of absorbing water, thermic conductibility, specific heat and resilient elasticity or power of rebounding.

This method of proceeding, although laborious, is believed to be alone capable of furnishing certain results.

[1] Edited by Professor H. Carvill Lewis, Academy of Natural Sciences, Philadelphia, to whom communications, papers for review, etc., should be sent.

[2] Bull. Soc. Mineralogique de France, T. vi, No. 6, p. 161.

The *hygrometricity*, or amount of moisture absorbed from the air, is obtained by heating the rock at 100° C. until the weight is constant, and reducing the result to decimals. In expressing the hygrometricity of basalt as 0.371, it is meant that 100 grammes of the dry rock weigh 100.371 after the expulsion of the humid air. The hygrometricity of limestone is 1.669.

The *imbibition*, or faculty of absorbing water, is measured by soaking the rock in water for some time under the bell glass of an air pump, and then weighing after it has been carefully wiped. It represents the maximum of water absorbed by 100 grammes of rock perfectly dried at 100° C. The imbibition of basalt is 0.551, of limestone 1.981.

The thermic resistance and coefficient of thermic conductibility is obtained by determining the time, in seconds, which it takes for an interval of temperature of 34° C., issuing from a fixed source of heat at 100° C. to traverse the thickness of one centimeter of rock. The temperature of the rock at the beginning and end of the experiment is noted, as well as its weight, amount of surface, thickness, etc., much care being required for this determination. The thermic resistance is obtained graphically from these data. For basalt it is given as 83, and for limestone as 59.

The specific heat is obtained by a method previously described by Lagarde and the author, and involves the immersion of the rock in alcohol whose volume, density and specific heat are previously known. Thomson's galvanometer is used in the experiments, and the specific heat of basalt is determined as 0.2699, and of limestone as 0.253.

The elasticity of rebounding, which is directly related to the molecular elasticity developed by either optical, thermic or mechanical vibrations, is determined very simply, by counting the number of times that a ball of ivory rebounds from the rock. While quartz causes the ball to rebound 42.2 times, basalt causes it to rebound 25.9 times, and limestone 35.48 times. Taking the elasticity of quartz as the unit, the resilient elasticity of basalt is 0.614, and of limestone 0.840.

STIBNITE FROM JAPAN.—The very beautiful crystals and groups of crystals of stibnite from Japan, are already well known to a number of mineralogists. The specimens, by their beauty, brilliancy and size, will attract attention in any cabinet. They are said to come from the Island of Jaegimeken Kannaizu, in South Japan, where the antimony mines have long been worked. The crystallized specimens are valued as ornaments by the natives, who sometimes mount them in flower pots and use them to adorn their dwellings.

In a recent paper in the *American Journal of Science*, by Professor E. S. Dana, describing some remarkably fine specimens recently received by the museum at Yale College, it is shown

that the crystals are noteworthy, not only on account of their size and beauty, but also for their great complexity of form.

Some crystals measured nearly two feet in length and two inches in diameter. They occur in groups, which consist of diverging crystals, many of which may be over a foot in length. The prismatic planes are deeply striated, and the end of each crystal is finely terminated by brilliantly polished planes. The luster of these planes is unexcelled among metallic minerals, and can be compared only with that of polished steel, as, for example, the surface of a razor blade.

Professor E. S. Dana has observed as many as *eighty-five* planes on these Japanese crystals. Forty-five planes was the largest number previously observed on stibnite, so that forty new planes are thus added. Some of the most complex crystals are the smallest ones. Sometimes, even on large crystals, the minute terminal planes are so rounded into each other that they could not be measured. Often these steep pyramidal planes so sharpen the end of the crystal as to give it a spear-shaped appearance.

A common peculiarity of the Japanese crystals, as indeed of all stibnite, is a bending over in the direction of the macrodiagonal axis. The edge of the crystal, near its termination, may be bent so as to form a right angle with itself. Crystals of stibnite from other localities have been described which were bent to such a degree as to form a complete ring. This curious peculiarity appears in all cases as if produced subsequently to the formation of the crystal. It has been shown that a slight pressure will permanently distort a crystal of stibnite.

The axial ratio as deduced from the measured angles is found to be :

$$a : b : c = 1 : 1.00749 : 1.02550$$

In order to preserve the brilliant luster of these crystals, we suggest that mineralogists keep them in a dark place, well protected from dust and dampness.

A Beautiful Crystal of Apatite.—A. Schmidt, of Strasburg, describes and figures in the last number of *Zeitschrift für Kryst.* (VII Band, 6 Heft), a remarkably beautiful crystal of colorless apatite from Floitenthale, a new locality. The specimen, which measures only about 1.5 centimeters in length, and which resembles a garnet in general shape, being nearly equi-axed, for geometrical beauty of shape and complex but symmetrical proportions can hardly be excelled, unless indeed the figure given greatly idealizes it. The specimen belongs to the Hungarian National Museum.

Precious Iolite from Brazil.—In looking over a collection of Brazilian minerals, Professor Groth recently noticed a colorless

prismatic mineral labeled topaz, which attracted his attention from the fact that it showed no trace of cleavage on the broken end, but had an irregular, conchoidal fracture. A trial of the specific gravity gave 2.67, too low for topaz, and it was concluded that the crystal was iolite (cordierite). The crystal was 1.5 centimeters long and 1 centimeter broad, larger than ever before known in Brazilian crystals. The absence of color in such a large crystal indicates that the usual deep bluish color is accidental and due to some coloring pigment.

Separation of Minerals according to the degree of Cohesion.—Büttgenbach[1] has suggested the separation of minerals on a large scale by making use of the difference in their degree of brittleness or firmness. Hitherto such separation has been effected mainly by differences in specific gravity or in attractability by the magnet. The author has devised a practical method of separating ores, based upon the fact that by casting two minerals of different degrees of hardness against a solid body, the one is broken into smaller pieces than the other. In separating pyrites from zinc blende the mixture was cast three times against the sides of a cylinder, and then sifted through separating drums, when it was found that the particles which passed through the finer sieves consisted chiefly of blende, while the larger pieces left behind were pyrites.

Lithiophilite.—Mr. S. L. Penfield[2] has published two new analyses of lithiophilite, which are of interest in that they substantiate the formula of an orthophosphate, Li (Mn, Fe) PO_4, for the species, and taken together with his previously published analyses, complete a series showing a gradual transition between the two extremes of a lithia-iron phosphate containing little manganese (triphylite) and a lithia-manganese phosphate containing but little iron (lithiophilite). Lithiophilite is, therefore, a manganesian variety of triphylite.

One of the analyses was made on a pale bluish, transparent, brilliant lithiophilite from Branchville, Conn., and the other upon specimens from Norway, Maine, a new locality. The specimens from the latter place are blackened on the exterior by the oxidation to which this mineral is particularly liable, but in the interior are of a light salmon color.

Some recently formed Minerals.—A. Lacroix has artificially produced crystals of gypsum by treating pulverized fluorite with sulphuric acid and then adding water. After standing for several months at a low temperature until the liquid had evaporated, small but beautiful transparent crystals of gypsum were found upon the fluorite and on the sides of the containing flask.

[1] *Dingl. Polytech. Journ.*, 248, 112.

[2] *Amer. Journ. Sc.*, Sept., 1883.

In crystalline form as well as in the mode of grouping, the crystals closely resemble some small crystals of gypsum which occur at the salt works of Bex, Canton of Vaux. These may also be of recent origin.

The same author has described some interesting minerals which have formed upon some old Roman coins of the time of the Emperor Alexander Severus (205–234 A. D.), which were buried in a mass of rubbish in Algeria. The coins contain eighty per cent of copper, sixteen per cent of lead and four per cent of tin, and through the action of dampness have become oxidized so as to form malachite, azurite, cuprite and cerussite. The coins were cemented by cavernous malachite, in the interstices of which were crystals of the above minerals. The cuprite occurred in cubes of cochineal-red color, and the azurite in clear blue crystalline masses. The cerussite, the most interesting mineral noticed, occurred both in crystals and in crystalline masses of yellowish-white color and adamantine luster. The crystals of this mineral, never before noticed under similar conditions, sometimes were directly implanted upon the partially altered coins.

Pyrites for Sulphuric acid.—It is now stated that sulphuric acid can be made as cheaply from American pyrites as from imported brimstone, and considering the great difference in freight between the two raw minerals, the price of acid made from our pyrites will be much lowered. Immense deposits of pyrites occur in Virginia, and these will undoubtedly be used in large quantities for the manufacture of sulphuric acid. Should the manufacturers of our sea-board cities use pyrites instead of sulphur for this purpose, it is stated that commercial acid (66° B.) can be made by them at one cent per pound. A most important industry of great value to the country can thus be opened, and many mines of pyrites will be opened to add to the mineral wealth of the Eastern States.

Picranalcime.—Some years ago Bechi described a mineral from Monte Caporciano, Tuscany, under the name of *picranalcime*. It was stated to be an analcime of a red color containing ten per cent of magnesia, and only a half per cent of soda, and was generally regarded by mineralogists as an alteration from analcime. Bamberger, however, has shown that ther is no magnesia in the mineral, and that in every respect, crystallographically, optically and chemically, it agrees with analcime. The name "picranalcime" must therefore be dropped from the list of minerals.

Mineralogical Notes.—To determine the mineralogical species to which the *jade* of different localities properly belongs, frequently requires a chemical analysis. Specimens of jade from New Zealand and from Southern Turkestan, the latter from a mine once worked by the Chinese, have been analyzed by C. L.

Allen and determined to be amphibole.——Klein has recently examined some crystals of *ullmannite* from Sardinia. The principal planes were those of the cube, which was striated as in pyrite, being due to the same cause, the repetition of pyritohedral edges. Pyritohedral and dodecahedral planes also occurred. The specific gravity was somewhat higher than usual, being 6.84. An analysis showed a mere trace of arsenic. The determined percentages of nickel, sulphur and antimony agree closely with the formula, Ni (Sb, S). The crystals were imbedded in calcite.—— It has been found that almost all platinum ore is magnetic, and that no purification can be effected by means of a magnet. Even a weak magnet will attract a large percentage of platinum along with the iron in an impure ore. Experiments have shown, indeed, that as much platinum as iron is attracted.——*Gold* is reported as occurring in a Cretaceous limestone in Williamson county, Texas. It is supposed to have originally existed as an auriferous pyrite, by the decomposition of which the sulphur has been removed, the iron oxidized and the gold concentrated.

BOTANY.[1]

Watson's Contributions to American Botany, xi.—We have the pleasure of again noticing another of Mr. Watson's frequent publications, this time a thick pamphlet of one hundred pages, extracted from the Proceedings of the American Academy of Arts and Sciences (Vol. xviii). It bears date of August 15, 1883, and contains descriptions of many new species. There is first a list of plants from Southwestern Texas and Northern Mexico, collected chiefly by Dr. E. Palmer in 1879–80, occupying nearly the whole pamphlet; this is followed by five pages devoted to descriptions of some new Western species.

The Commelinaceæ of the United States are revised in a footnote, and a synopsis of genera and species given. There is likewise a revision of the genus Bouteloua, based upon a study of the material in the Gray Herbarium. Twenty-five species are recognized, as follows: 1. *B. tenuis* Griseb., Mexico; 2. *B. prostrata* Lag., W. Texas and New Mexico to Mexico; 3. *B. simplex* Lag., South America; 4. *B. scorpioides* Lag., Mex.; 5. *B. hirsuta* Lag., Ill. to Tex., Arizona and Mex.; 6. *B. oligostachya* Torr., Saskatchewan to Tex., Ariz., S. E. Cal. and Mex.; 7. *B. polystachya* Torr., S. Utah to Tex., S. Cal. and Mex.; 8. *B. eriopoda* Torr., W. Tex. and New Mex.; 9. *B. trifida* Thurber, W. Tex., New Mex. and Mex.; 10. *B. burkei* Scribner, W. Tex. and New Mex.; 11. *B. racemosa* Lag., N. Y. and Pa. to Wis., Tex., Ariz. and Mex. [this is the *B. curtipendula* Torr., of the manuals]; 12. *B. bromoides* Lag., W. Tex. to Ariz. and Mex ; 13. *B. havardi* Vasey, W. Tex.; 14. *B. chondrosioides* Benth., Mex.; 15. *B. litigiosa* Lag., W. Indies;

[1] Edited by Prof. C. E. Bessey, Ames, Iowa.

16. *B. elatior* Griseb., W. Indies; 17. *B. ciliata* Griseb., S. America; 18. *B. lophostachya* Griseb., S. America; 19. *B. nana* Griseb., S. America; 20. *B. pilosa* Benth., Galapagos islands; 21. *B. aristidoides* Thurber, New Mex. to S. Cal. and Mex.; 22. *B. triathera* Benth., Mex.; 23. *B. texana* Watson, Tex.; 24. *B. disticha* Benth., Peru; 25. *B. multiseta* Benth., Brazil.

A Hybrid Moss.—H. Philibert records (*Rev. Bryol.*, x) a new instance of a hybrid moss found wild, between *Orthotrichum diaphanum* and *O. sprucei*. He considers it a true instance of a hybrid sporogonium, resulting from the fertilization of an archegonium of *O. sprucei* by antherozoids of *O. diaphanum*. The hybrid was intermediate in its characters between the two parents, and also in the time of producing its reproductive organs.—*Jour. Royal. Mic. Society for August, 1883.*

Projectile Force in Æcidium.—Dr. Alexander Zalewski has recently made some interesting observations on the force with which spores of the Æcidiums are discharged. He finds that in Æcidiums growing on thick coriaceous leaves or on stems and petioles, the spores are thrown vertically 10–20$^{mm.}$

The species in which he has noted this great projectile force, are the Æcidium of *Uromyces pisi* on *Euphorbia cyparissias*, the *Æcidium* of *Puccinia straminis* on *Lycopsis arvensis* and *Æcidium symphyti* on *Symphytum officinale*, while the Æcidiums on thinner leaves, as the *Æcidium* of *Puccinia calystegia* on *Calystegia sepium* and the *Æcidium* of *P. coronata* on leaves of Rhamnus discharged their spores with a force sufficient to throw them vertically only 4–6$^{mm.}$ or at most 8$^{mm.}$ He also notes that from cups of this latter species, growing on the petioles of the leaves, the spores were thrown higher than from those on the thin lamina of the leaf.—*Inaugural dissertation delivered before the Kaiser-Wilhelms-Universitat at Strassburg, 1883.*

New Species of North American Fungi.—*Septoria xanthifolia* E. & K.—Epiphyllous, on light brown, rather indefinitely bordered and irregularly shaped spots, 1-4^{mm} diam., scattered over the leaf and giving it a scorched or withered look; perithecia rather numerous, slightly prominent, black, minute (70μ.); spores abundant, short, 20–30 × 1¼–1½μ., slightly curved and faintly nucleolate, yellowish. On leaves of *Iva xanthifolia*.

Septoria cacaliæ E. & K.—Spots rusty brown, elongated or nearly circular, ¼–½^{cm} diam., with a distinct raised border and often including 1–2 smaller white spots (1–4^{mm}), which also have a distinct raised border of their own, these white spots also occur in the green portions of the leaf; perithecia amphigenous (on both the brown and white spots) or scattered over dead parts of the leaf, about 100μ. diam, black and slightly prominent; spores abundant, nearly straight, 30–35 × 1–1½μ., faintly nucleolate. On leaves of *Cacalia tuberosa*. Manhattan, Kansas, Aug., 1883.

judging from the symmetry of the matrices of the meropodites, as well as from the general cylindrical character of limbs themselves.

On the ventral surface of the pygidium there are at least twelve (pairs of) appendages; posteriorly, an exact enumeration is impossible. The term *pairs* is used on account of the median groove, showing in the structures a bilobed character. This groove is continuous with the thoracic groove, and is somewhat narrower and more shallow than the latter. From an examination of the two specimens, these twelve or more appendages appear to be leaf-like, or foliaceous, and on each side of the median groove the direction was outward and somewhat forward. No doubt these appendages were branchial in function, and also adapted to swimming.

EXPLANATION OF PLATES XXVI AND XXVII.

FIG. 1.—Natural size. *a a*, meropodites of anterior pair of appendages—maxillipedes; *b b*, eighth pair of (thoracic) legs; *c*, articulation between carpopodite and propodite; *d*, articulation between propodite and dactylopodite; *e*, branchigerous organs beneath pygidium.

FIG. 2.—The specimens 1 and 3 fitted together, and reduced to nearly one-third nat. size.

FIG. 3.—*a a*, matrices of meropodites of anterior pair of appendages; *b b*, matrices of eighth pair of legs; *c*, branchigerous appendages; *d*, left maxillipede, probably chelate; *e*, left lobe of hypostoma.

—*J. Mickleborough, Journ. Cincinnati Soc. Nat. Hist.*

GEOLOGICAL NOTES. — *Triassic and Permian.* — Among new Stegocephali lately described by Herr Credner from the Dyas of Saxony, are *Acanthostoma vorax*, *Melanerpeton spiniceps*, and *Discosaurus permianus*. The last is remarkable for the round disk-like plates, built up of concentric rings, that cover its body.

Cretaceous.—M. L. Dollo (Bull. du Mus. Roy. d'Hist. Nat. Belg.) describes some remains of dinosaurs from the Upper Cretaceous of Belgium. Two vertebræ from the Mæstricht beds may perhaps belong to the form described from the same beds by Professor Seeley. An ungual phalanx from Louzee is evidently that of a carnivorous dinosaur of about half the size of Megalosaurus, and less specialized than that saurian; while two singular teeth having crenulated borders as in Iguanodon, but differing from those of the latter in their antero-lateral compression and other details of form, as well as in the fineness of the serrations, are ascribed to a new genus and species, and named by M. Dollo *Craspedodon louzeensis*.

Tertiary.—In a recent issue of the *Geological Magazine*, Professor Owen gives a basal view of the skull of Thylacoleo, showing clearly the very small size of the space for the cranial cavity and the expansion and strength of the zygomatic arches.

MINERALOGY[1].

Minerals of the Cryolite group from Colorado. — W. Cross and W. F. Hillebrand,[2] who have previously described a number of interesting species from the vicinity of Pike's Peak, have identified cryolite and several allied fluorides from the same region, and have given a very exhaustive account of their method of occurrence, physical and crystallographic characters, and chemical relations. Cryolite occurs in massive aggregates of crystalline individuals, and when fresh has often a delicate pink or rose color. As products of alteration there occur pachnolite, thomsenolite, gearksutite, prosopite and probably ralstonite. These all occur in a vein of white quartz, near the base of St. Peter's dome. Astrophyllite and altered columbite occur at the same locality. The cryolite is decomposed where it adjoins the quartz, and is replaced by a massive mixture of pachnolite and thomsenolite, which is sometimes so far decomposed as to produce a white powder-like kaolin, which, when wet, makes a thick mud or paste. This kaolin-like substance is shown to be gearksutite Under the microscope it is seen to consist of minute colorless needles. A chemical examination of the pachnolite, which occurs in distinct, colorless, transparent crystals upon the cryolite, proved that in chemical composition it was identical with thomsenolite. This result does not agree with that obtained by Groth and Brandl[3] in a recent investigation upon the fluorine minerals.

In another quartz vein about one-third of a mile distant from the first locality, there were found zircon, kaolin, etc., a greenish-yellow mica and fluorite. Adjoining the quartz was an irregular zone of purple or green fluorite, and next to this a mass of a colorless mineral with two distinct cleavage planes, rarely occurring in minute crystals. This has been shown to be *prosopite*, a mineral heretofore known only in connection with the tin-bearing veins of Altenberg, Saxony. Prosopite was also found in minute crystals upon altered pachnolite in the quartz veins first mentioned. The identification of this rare species is of much interest. The authors deserve much credit for the care and skill which they have applied to the study of the minerals in the neighborhood of Pike's Peak.

The Uranium Minerals —Heinrich Baron von Foullon has published[4] an exhaustive paper on the decomposition products of uraninite, and on the chemical separation of uranium from lime and other substances, and comes to some important conclusions of interest to mineralogists. The uranium minerals examined are

[1] Edited by Professor H. Carvill Lewis, Academy of Natural Sciences, Philadelphia, to whom communications, papers for review, etc., should be sent.

[2] *Amer. Jour. Sc.*, Oct., 1883.

[3] Zeits. f. Kryst., VII.

[4] Jahrbuch d. K. K. Geolog. Reichsanstalt, 1883, B. XXXIII, p. 1.

from both European and American localities, special attention, however, being given to the gummite and associated minerals from North Carolina. After a discussion of the various analyses made by different chemists, and an examination of the homogeneity of the specimens analyzed, it is concluded that the minerals known as eliasite, pittinite and coracite are mere varieties of gummite, not entitled to distinctive names, and that uranotil is identical with uranophane, and should therefore be dropped as a mineral species.

Both gummite and uranophane result from the alteration of uraninite (pechurane), and therefore very properly follow that species in the classification of some authors.

Minerals from Lehigh and Berks counties, Pa. — E. F. Smith and D. B. Brunner[1] contribute a series of analyses of minerals which occur in Lehigh and Berks counties, Penna., and describe a nmber of new localities.

Allophane, occurs near Ballietsville, Lehigh county, in the form of white, mammilary, stalactitic incrustations upon iron ore. *Fluorite* is intimately mixed with the limestone about a mile and a half south-east of the above locality, presenting beautiful green, purple and pink colors. Perfect octahedra of deep purple color occur south of Emaus in the Lehigh mountains. *Zircon* was observed in minute crystals in quartz in Upper Milford township, Lehigh county. *Wavellite* from the same vicinity occurs in fine colorless, radiating nodules. Associated with it were clay-like nodules, sometimes showing a radiated structure, which have probably resulted from the alteration of wavellite. These appear to have no definite composition. *Corundum* in fine crystals, sometimes showing asterism, occurs in the same township. *Tourmaline*, *menaccanite* and *garnet* also occur here, and their analyses are given.

Other minerals from Lehigh county are *stilbite*, *pyrolusite* and *chloropal*, the latter being a soft yellowish green substance accompanying iron ore. The mineral is earthy and may be polished by friction.

In Berks county, new localities and analyses are given for *stilbite*, *dewеylite*, *vesuvianite*, *titanite* and *brucite*. Vesuvianite and brucite were found at the now well-known mineral locality of Fritz island, near Reading. The latter mineral forms thin colorless laminæ in seams intersecting limestone.

Mineralogical Notes.—In the death of Professor J. Lawrence Smith, at Louisville, Ky., on October 12, American mineralogy loses one of its most eminent masters. His memoirs on corundum and emery, and his numerous physical and chemical investigations on meteorites, together with his many contributions to chemical mineralogy, have made his name well known to scientific

[1] *Amer. Chem. Journ.*, Sept., 1883.

men all over the world. In 1877 he described under the name of rogersite a mineral resulting from the alteration of samarskite. In the same year Daubrée, of Paris, named after him the mineral Lawrencite, a protochloride of iron first detected by Dr. Smith in meteorites. Dr. Smith has published in book form a collection of his memoirs of especial interest to mineralogists. He was one of the few American members of the Academy of Sciences of Paris.——At the American exhibition recently held in Boston, several States exhibited collections of minerals. North Carolina was especially well represented, making a large exhibit of beautiful and often rare species. Among the most noteworthy minerals were the following: *Gummite* in a mass weighing six and a half pounds; *uraninite* in masses of several pounds weight; crystals of *monazite*, *fergusonite* and *xenotime;* large masses of *allanite* and *samarskite*, one specimen of the latter weighing five pounds; crystals of *emerald* over five inches long; brilliant prisms and geniculations of *rutile; quartz* showing basal and other rare planes; beautiful crystals of spodumene, beryl, etc.——The rare mineral *hörnesite*, a hydrous arseniate of magnesia, has probably been identified by M. E. Bertrand accompanying nagyagite from Nagyag, Transsylvania. The crystals of hörnesite are of a pale rose color, have a talcose cleavage and are quite soft.——According to the newspapers, "Missouri is said to have a new mineral, adamscolite, that cuts steel."——What was probably one of the richest finds of gold ever made in this country at one time, was discovered recently in Amador county, Cal., according to a paper published there, which says a pocket of quartz, found less than 100 feet below the surface, and containing about two tons in quantity, yielded from $75,000 to $100,000. Much of the quartz, it is represented, consisted of what were virtually chunks of gold.——Tin ore is reported to occur in Rockbridge county, Virginia. A vein of cassiterite, several inches in thickness, runs nearly east and west through a gneiss containing large crystals of feldspar with mica and quartz.

BOTANY.[1]

A NEW SPECIES OF INSECT-DESTROYING FUNGUS (see AMER. NAT., Vol. XV, p. 52).

Entomopthora calopteni, n. sp.—I. Empusa stage, not seen.

II. Tarichium stage: Oöspores globular, or from pressure somewhat irregular in outline, colorless, 36 to 39μ. in diameter; walls thick (4μ.), colorless, smooth; protoplasm granular, often as if composed of many small cells, often with a large round vacuole.

Occurring as a clay-colored mass in the body cavity and femora of *Caloptenus differentialis*. Ames. Iowa, Aug. and Sept., 1883.

This is much like the species described by Peck (31st Report

[1] Edited by PROF. C. E. BESSEY, Ames, Iowa.